CE TIPS
CE FOR YOUR PC
SEPTEMBER 2004

Your User Guide To Consumer Electronics & Computers

A Sandhills Publication

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Consumer Electronics

CONSUMER ELECTRONICS TIPS

CE For Your PC

How To Use & Fix Your System's Multimedia Peripherals

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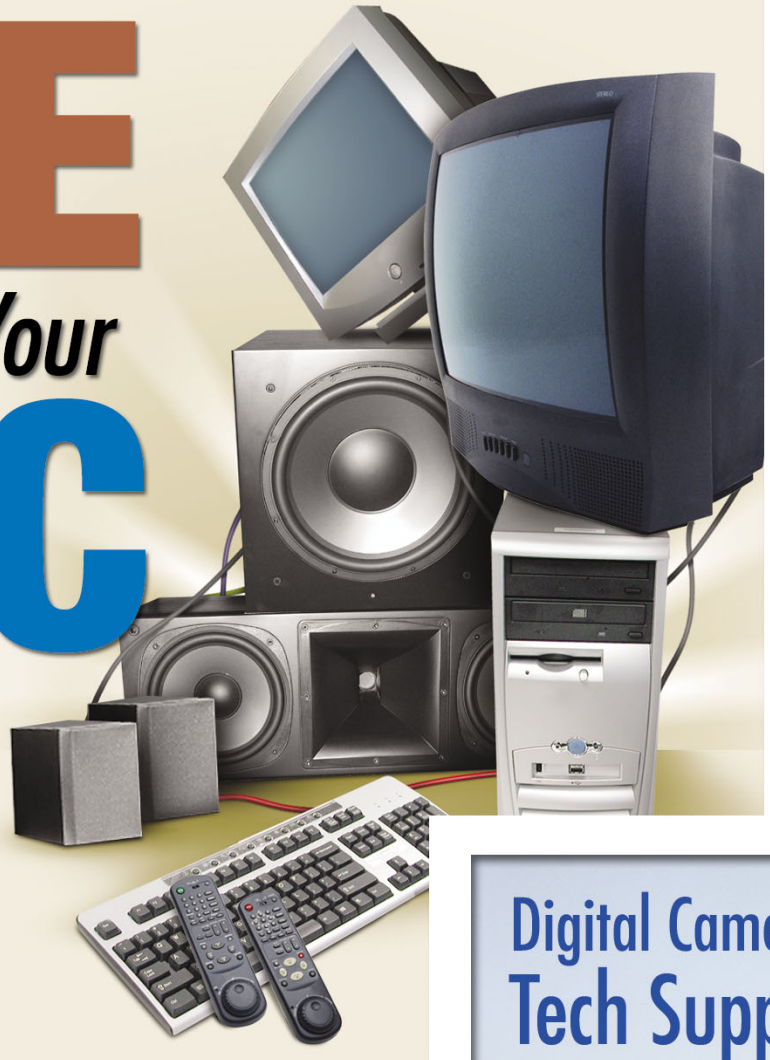

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Simple Fixes For Common Problems

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September 2004
Vol. 2 Iss. 9
$5.99 U.S.
$7.99 Canada

IBM recommends Microsoft® Windows® XP Professional.

IBM ThinkPad R Series

GO with IBM Think Express Program

IBM ThinkExpress models are designed, configured and priced with small to medium-size businesses in mind.

CNET Editors Choice Award, March, 2004
IBM ThinkPad X40

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As the world's most secure wireless PCs, these IBM wireless ThinkPad® notebooks offer an added layer of data protection – a vaultlike combination of a built-in security chip and sophisticated data encryption software. In fact, it's so advanced, it actually makes data unreadable if tampered with. And only IBM offers PCs with this level of security as a standard feature. Plus, with Intel® Centrino™ Mobile Technology and on-the-fly folder encryption, users can work wherever they please, knowing that their data will be protected. No matter who's lurking around. To see a demo, go to **ibm.com**/shop/m473. Instead of a welcome mat.

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IBM ThinkPad R51

Ultimate Value

Distinctive IBM Innovations:

- IBM Embedded Security System 2.0[13] – Strongest security as a standard feature

System Features:

- Intel® Centrino™ Mobile Technology
  - Intel Pentium® M Processor 1.50GHz[1]
  - Intel PRO/Wireless Network Connection 802.11b[2]
- Microsoft Windows XP Professional[3]
- 14.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM[5]
- 20GB hard drive[4]
- Ultrabay™ Enhanced CD-RW/DVD-ROM combo
- IBM UltraConnect™ Antenna for increased signal strength[12]
- 1-yr system/battery limited warranty[6]

NavCode 28832XU-M419

THINK EXPRESS MODEL PRICED AT: **$1,299***

ServicePac® Service Upgrade:[7]
3-yr Depot Repair #30L9192 **$132**

IBM ThinkPad X40

Our thinnest and lightest

Distinctive IBM Innovations:

- IBM Embedded Security System 2.0 – Strongest security as a standard feature
- NEW! IBM Rescue and Recovery™ with Rapid Restore™ – One-button recovery and restore solution

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor ULV 1GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM
- 20GB hard drive
- Integrated Gigabit Ethernet and modem
- Legendary IBM full-size keyboard[8]
- Only .94" thin[11]
- 2.7-lb travel weight[10]
- 1-yr system/battery limited warranty[6]

NavCode 23861CU-M419

THINK EXPRESS MODEL PRICED AT: **$1,499**

objectives and are not guarantees. Calls must be received by 5pm local time in order to qualify for Next Business Day service. If the machine problem turns out to be a Customer Replaceable Unit (CRU), IBM will express ship the part to you for quick replacement. Onsite 24x7x2-hour service is not available in all locations. For ThinkPad notebooks requiring LCD or other component replacement, IBM may choose to perform service at the depot repair center. **(8) Full-size keyboard:** As defined by ISO/IEC 15412. **(10) Travel weight:** includes battery and optional travel bezel instead of standard optical drive in Ultrabay bay, if applicable; weight may vary due to vendor components, manufacturing process and options. **(11) Thinness:** may vary at certain points on the system. **(12) Wireless capability:** requires compatible wireless-enabled options, sold separately. **(13) Embedded Security Subsystem:** requires software download. **Trademarks:** The following are trademarks or registered trademarks of IBM Corporation: IBM, the IBM logo, Rapid Restore, Rescue and Recovery, ThinkPad, Ultrabay, UltraConnect and UltraNav. Microsoft and Windows are registered trademarks of Microsoft Corporation. Intel, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Intel SpeedStep and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Other company, product and service names may be trademarks or service marks of other companies.
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Take a look at some of our latest models. And get state-of-the-art security.

Why IBM ThinkPad Notebooks?

To make IBM ThinkPad® notebooks even more valuable, each one featured here can give you the efficiency, productivity and edge you need and comes with all the following ThinkVantage™ Technologies:

IBM Active Protection System:

Butterfingers unite! IBM ThinkPad notebooks now include airbag-like technology to help protect your hard drive from some damage caused by drops and jolts (select models).

NEW! Rescue and Recovery with Rapid Restore:

Lost your data because of a software crash or virus? Recover previously saved data in minutes with our one-button solution.

Access Connections:

Switch between wired and wireless connections.

Embedded Security Subsystem 2.0:[1]

Hackers and thieves, beware. Our combined hardware and software solution is designed to protect user data and keep it private.

Access IBM:

Get the help you need, when you need it. One button on your ThinkPad notebook brings you a world of resources and assistance.

IBM ThinkPad R51

System Features:

- Intel® Centrino™ Mobile Technology
  - Intel Pentium® M Processor 1.50GHz[2]
  - Intel PRO/Wireless Network Connection 802.11b[3]
- Microsoft Windows XP Professional[4]
- 15" SXGA+ TFT display (1400x1050)
- 256MB DDR SDRAM[5]
- 40GB hard drive[6]
- Integrated Ethernet and modem
- IBM Ultrabay™ Enhanced CD-RW/DVD-ROM combo
- IBM UltraConnect™ Antenna for increased signal strength[16]
- 1-yr system/battery limited warranty[7]

NavCode 1836BDU-M419

THINK EXPRESS MODEL PRICED AT: **$1,499***

With Microsoft Office Small Business Edition 2003:[8] $1,739

IBM ThinkPad T42

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor 1.50GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 14.1" XGA TFT display (1024x768)
- 32MB ATI Mobility RADEON 7500
- 256MB DDR SDRAM
- 30GB hard drive
- Integrated Gigabit Ethernet and modem
- IBM Ultrabay Slim DVD-ROM
- IBM UltraConnect Antenna for increased signal strength
- Only 1" thin,[10] 4.5-lb travel weight[9]
- 1-yr system/battery limited warranty[7]

NavCode 2378DTU-M419

THINK EXPRESS MODEL PRICED AT: **$1,549**

With Microsoft Office Small Business Edition 2003: $1,789

ServicePac® Service Upgrade:[11]
2-yr Onsite Repair/9x5/Next Business Day Response #30L9189 **$197**

IBM ThinkPad T42

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor 735 (1.70GHz)
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 14.1" XGA TFT display (1024x768)
- 32MB ATI Mobility RADEON 7500 graphics
- 256MB DDR SDRAM
- 40GB hard drive
- Integrated Gigabit Ethernet and modem
- IBM Ultrabay Slim CD-RW/DVD-ROM combo
- IBM UltraConnect Antenna for increased signal strength
- 1-yr system/battery limited warranty[7]

NavCode 2378FTU-M419

THINK EXPRESS MODEL PRICED AT: **$1,749**

With Microsoft Office Small Business Edition 2003: $1,989

ServicePac Service Upgrade:
4-yr Depot Repair #69P9195 **$249**

IBM ThinkPad T42

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor ULV 1.5GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 15" XGA TFT display (1024x768)
- 32MB ATI Mobility RADEON 7500
- 256MB DDR SDRAM
- 40GB hard drive
- Integrated Gigabit Ethernet and modem
- Ultrabay Slim CD-RW/DVD-ROM Combo
- Only 1" thin, 4.5-lb travel weight
- 1-yr system/battery limited warranty[7]

NavCode 2378DWU-M419

THINK EXPRESS MODEL PRICED AT: **$1,649**

With Microsoft Office Small Business Edition 2003: $1,889

ServicePac Service Upgrade:
3-yr Depot Repair #30L9192 **$132**

IBM ThinkPad T42

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor 735 (1.70GHz)
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 15" SXGA+ XGA+ TFT display (1400x1050)
- 64MB ATI Mobility RADEON 9600 graphics
- 512MB DDR SDRAM
- 60GB hard drive
- Integrated Gigabit Ethernet and modem
- IBM Ultrabay Slim CD-RW/DVD-ROM combo
- IBM UltraConnect Antenna for increased signal strength
- 3-yr system/1-yr battery limited warranty[7]

NavCode 2379DXU-M419

THINK EXPRESS MODEL PRICED AT: **$2,399**

ServicePac Service Upgrade:
3-yr Onsite Repair/9x5/Next Business Day Response #30L9195 **$243**

IBM ThinkPad X40

IBM ThinkVantage Technologies:

- Longest standard battery life of any leading-brand notebook[13]

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor LV 1.20GHz
  - Intel PRO/Wireless Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- Intel Extreme Graphics 2
- 256MB DDR SDRAM
- 40GB hard drive
- Integrated Gigabit Ethernet and modem
- Legendary IBM fullsize keyboard[12]
- 7.5hr Li-Ion battery[17]
- 1-yr system/battery limited warranty[7]

NavCode 23866GU-M419

THINK EXPRESS MODEL PRICED AT: **$1,749**

ServicePac Service Upgrade:
3-yr Onsite Repair/9x5/Next Business Day Response #30L9195 **$243**

IBM ThinkPad X40 Solution Pack

IBM ThinkVantage Technologies:

- Longest standard battery life of any leading-brand notebook

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor LV 1.20GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM
- 40GB hard drive
- Integrated Gigabit Ethernet and modem
- 7.5-hr Li-Ion battery
- 3-yr system/1-yr battery limited warranty[7]

Accessories Included:

- ThinkPad X4 UltraBase Dock
- IBM Ultrabay Slim CD-RW/DVD-ROM combo

NavCode 23826UU-M419

THINK EXPRESS MODEL PRICED AT: **$2,199**

ServicePac Service Upgrade:
5-yr Onsite Repair/9x5/Next Business Day Response #69P9200 **$449**

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IBM recommends Microsoft® Windows® XP Professional.

(Monitor not included)

(Monitor not included)

(Monitor not included)

Why IBM ThinkCentre PCs?

Only IBM offers these features to protect your users, connect them, and keep them working. Each ThinkCentre™ desktop featured here can give them the efficiency, productivity and edge they need with the following ThinkVantage Technologies:

NEW! Rescue and Recovery with Rapid Restore:

Lost your data because of a software crash or virus? Recover previously saved data in minutes with our one-button solution.

Access IBM:

Get the help you need, when you need it. One button on your ThinkCentre desktop brings you a world of resources and assistance.

ImageUltra™ Builder:

Need to roll out new systems? Image and copy your operating system across your network in a flash. (Order separately)

NEW! IBM ThinkCentre A50

System Features:

- Intel® Pentium® 4 Processor 520 with HT Technology
  - Processor speed 2.80GHz
  - 800MHz FSB
- Microsoft Windows XP Professional
- 256MB DDR PC3200[5]
- 40GB hard drive • CD-RW
- Integrated 10/100 Ethernet
- Norton AntiVirus™ with 90 days of virus definition updates
- Lotus® SmartSuite® Millennium license
- 1-yr parts/1-yr limited onsite service limited warranty[14]

NavCode 814812U-M419

THINK EXPRESS MODEL PRICED AT: **$699**

IBM ThinkCentre A50

System Features:

- Intel Pentium 4 Processor with HT Technology 2.80GHz
- Microsoft Windows XP Professional
- 62% smaller than a standard desktop
- 256MB DDR PC2700
- 40GB hard drive • CD-ROM
- Integrated 10/100 Ethernet
- Norton AntiVirus with 90 days of virus definition updates
- Lotus SmartSuite Millennium license
- 3-yr parts limited warranty with 1-yr limited onsite service[14]

NavCode 841933U-M419

THINK EXPRESS MODEL PRICED AT: **$749**

ServicePac Service Upgrade:
4-yr Onsite Repair/9x5/Next Business Day Response #69P9158 **$198**

NEW! IBM ThinkCentre A50

System Features:

- Intel Pentium 4 Processor 530 with HT Technology
  - Processor speed 3.0GHz
  - 800MHz FSB
- Microsoft Windows XP Professional
- 256MB DDR PC3200
- 40GB hard drive • CD-ROM
- Norton AntiVirus with 90 days of virus definition updates
- Integrated 10/100 Ethernet
- Lotus SmartSuite Millennium license
- 3-yr limited warranty with limited onsite service[14]

NavCode 814721U-M419

THINK EXPRESS MODEL PRICED AT: **$899**

IBM ThinkCentre S50

System Features:

- Intel Pentium 4 Processor with HT Technology 2.80GHz
- Microsoft Windows XP Professional
- 62% smaller than a standard desktop
- 512MB DDR PC2700
- 40GB hard drive • CD-ROM
- Norton AntiVirus with 90 days of virus definition updates
- Gigabit Ethernet-integrated
- 3-yr limited warranty with limited onsite service[14]

NavCode 818336U-M419 **$1,079**

With Microsoft Office Small Business Edition 2003: $1,319

ServicePac Service Upgrade:
4-yr Onsite/9x5/4-hr Response #69P9162 **$250**

IBM ThinkCentre M50

System Features:

- Intel Pentium 4 Processor with HT Technology 2.80GHz
- Microsoft Windows XP Professional
- 512MB DDR PC2700
- 40GB hard drive • CD-ROM
- Intel Extreme Graphics 2
- Gigabit Ethernet-integrated
- 3-yr limited warranty with limited onsite service[14]

NavCode 8187EJU-M419 **$1,049**

With Microsoft Office Small Business Edition 2003: $1,288

ServicePac Service Upgrade:
3-yr Onsite/9x5/4-hr Response #41L2734 **$129**

intel inside centrino™ MOBILE TECHNOLOGY

IBM ThinkExpress Program:

We've designed and priced many of our products specifically for small and medium businesses. And best of all, they're available direct from IBM or through select IBM Business Partners.

IBM ThinkPad Accessories

Belkin Components Universal Notebook Travel Surge Protector
#22P7127 **$20**

Targus Deluxe Mobile Essentials Kit
#22P7437 **$60**

ThinkPad Carrying Case[15] – Leather Attache
#73P3600 **$129**

ThinkPad 72W AC/DC Combo Adapter
#22P9010 **$99**

ThinkPad Port Replicator II
#74P6733 **$179**

IBM ThinkCentre Accessories

IBM 128MB USB 2.0 High-Speed Memory Key
#22P9229 **$59**

Lexmark X5270 All-in-One Printer
#22P8808 **$140**

IBM ThinkVision™ L150 15" Flat Panel Monitor with system purchase
#W9SPAB1 **$379**

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due to vendor components, manufacturing process and options. **(10) Thinness:** may vary at certain points on the system. **(11) ServicePac services:** are available for machines normally used for business, professional or trade purposes, rather than personal, family or household purposes. Service period begins with the equipment date of purchase. Service levels are response-time objectives and are not guarantees. If the machine problem turns out to be a Customer Replaceable Unit (CRU), IBM will express ship the part to you for quick replacement. Onsite 24x7x2-hour service is not available in all locations. For ThinkPad notebooks requiring LCD or other component replacement, IBM may choose to perform service at the depot repair center. Calls must be received by 5pm local time in order to qualify for Next Business Day Service. **(12) Full-size keyboard:** As defined by ISO/IEC 15412. **(13) Battery life:** Based on manufacturer's published figures or CNET.com results for the top 5 vendors in 2003 notebook sales based on IDC data, as of 1/29/2004. **(14) Systems with limited onsite service:** are designed to be repaired during the applicable warranty period primarily with customer-replaceable parts provided by IBM. IBM will only send a technician onsite to perform a repair if (a) remote telephone diagnosis and/or customer part replacement are unable to resolve the problem, or (b) the part is one of the few designated by IBM for onsite replacement. For a list of onsite replaceable parts, contact IBM. Support unrelated to a warranty issue may be subject to additional charges. **(15) Certain IBM logo products:** are not manufactured, warranted or supported by IBM; IBM logos and trademarks used under license. Contact IBM for details. **(16) Wireless capability:** requires compatible wireless-enabled options, sold separately. **(17) Battery:** These model numbers achieved the Ziff Davis Media, Inc.'s Business Winstone® 2002 BatteryMark™ Version 1.0 Battery Rundown Time of at least the time shown. This test was performed without independent verification by the VeriTest testing division of Lionbridge Technologies, Inc. ("VeriTest") or Ziff Davis Media, Inc.; neither Ziff Davis Media, Inc., nor VeriTest makes any representations or warranties as to these test results. Winstone is a registered trademark and BatteryMark is a trademark of Ziff Davis Publishing Holdings, Inc., in the U.S. and other countries. A description of the environment under which the test was performed is available at ibm.com/pc/ww/thinkpad/batterylife. Battery life (and recharge times) will vary based on many factors including screen brightness, applications, features, power management, battery conditioning and other customer preferences. **Trademarks:** The following are trademarks or registered trademarks of IBM Corporation: IBM, the IBM logo, ImageUltra, Lotus, NavCode, Rapid Restore, Rescue and Recovery, SmartSuite, ThinkCentre, ThinkPad, ThinkVantage, ThinkVision, UltraConnect, UltraBase, Ultrabay and UltraNav. Microsoft and Windows are registered trademarks of Microsoft Corporation. Intel, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Intel SpeedStep and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Other company, product and service names may be trademarks or service marks of other companies. © 2004 IBM Corporation. All rights reserved.

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Consumer Electronics

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Volume 2 Issue 9

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Open

We open this issue of *CE Tips* with 14 pages packed with electronics news, quick looks at some of the latest gear, a bit of commentary, and 10 tips on using GPS (Global Positioning System) receivers more effectively. Oh yeah, and we also show you what $5,700 speaker cables look like in this month's installment of Extreme CE.

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10 **CE News**

14 **ShelfWatch**
A Look At The Latest Consumer Electronics

18 **Shuffle**
Getting Rid Of Local Phone Roadblocks

20 **Extreme CE**
When Money Is No Object

22 **Gadget Envy**
Light Our Fires

A/V Club

Whether you're building a dedicated home theater or you just can't settle for anything less than a 100-inch TV screen, a digital projector might be your best option. Find out how to install one like a pro in this month's A/V Project, then get some troubleshooting pointers for your hi-fi system and take a look at what power regulators can do for your home electronics. Also, check in with Brian Hodge on page 37 to see what some people are doing to their TiVo digital video recorders: Gentlemen will gasp, children will shriek, and ladies will swoon.

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Install A Home Theater Projector

30 **Hi-Fi Tech Support**
Fix The Old Components Even As You Add New Ones

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Reverse 3:2 Pulldown

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Home Theater Power Regulation

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TiVo, Your Way

CE For Your PC

Many of the great consumer electronics products we enjoy today tie in somehow to the household PC. In fact, as we've discussed in these pages before, the lines between what we think of as consumer electronics products and computing products is growing increasingly blurry. That's why we put together 18 pages of helpful how-to information for CE-related PC audio, video, storage, and digital imaging peripherals. Whether you're looking for help installing a new video card or positioning your fancy new 5.1 surround-sound PC speakers, you'll find answers to many of your queries inside.

40 **CE Thrives On The PC Connection**
Listen To Music, Watch TV, Edit Pictures, Store Data & So Much More

42 **Pretty As A Picture**
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46 **Cope With An Expanding Universe**
Hard Drives & Optical Storage For Your PC

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How To Set Up, Use & Troubleshoot Audio Components

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Troubleshooting Tips For Better Visuals

Digital Studio

DIVE INTO THE DIGITAL STUDIO SECTION this month for pointers on effective landscape photography, solutions to common digicam problems, and a look at how lens filters can make you a better photographer and/or filmmaker.

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Expand Your Ambitions With Landscape Photography

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Use Filters To Enhance Your Photos

CE @Home

INTERNET PHONE SERVICE FROM A COMPANY CALLED Skype is making mammoth telcos sit up and take notice. Find out how, then get some pointers on fixing irritating home network problems and see what the next wave of handheld gaming systems holds in store.

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Press Play

WHAT DO TINY DIGITAL CAMCORDERS AND UNDERWATER MP3 PLAYERS HAVE IN COMMON? You'll find one of each plus a whole lot more in CE Lite on page 100. Read on to get a sampling of the latest movie, music, and game releases, then bone up on the history of one of our favorite PC peripherals: the modem.

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On The Lighter Side Of Technology

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The Latest Tracks and Flicks: Are You Not Entertained?

105 **Game On**
This Month's Blockbusters Will Twist Your Mind

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The Rise & Fall Of Dial-Up

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Future Perfect

Web-Only Articles

There's so much going on in the world of consumer electronics that it won't all fit in our magazine, so we're serving up a few extra *CE Tips* articles and reviews at www.cetips.com. If you're a *CE Tips* subscriber (or if you subscribe to *Smart Computing*, *PC Today*, or *Computer Power User*), head to the online table of contents for this issue, and you'll find links to each of the articles mentioned here.

State-Of-The-Art TV & Radio
Mass Media Technologies In The Digital Age

A/V Tips
12 Pointers On Caring For Audio & Video Components

DVD Movie Review:
Film Noir: Classic Collection

Corrections

In last month's article on hyperfocal distance, "The Near & Far Of It," a few mathematical symbols didn't translate into print as they should have. For example, on page 64, the empty set of parentheses in the second column should have contained the symbol for infinity (∞). On page 66, the mathematical formula for figuring HFD near the end of the second column should have read:

$$\frac{L^2}{F \times CoC \times 0.0033}$$

On page 67, the formula for measuring the diagonal of the image sensor should read:

$$D = \sqrt{W^2 + H^2}$$

And the formula illustration should have read:

$$D = \sqrt{24^2 + 16^2} = 28.8444$$

Editor's Note

It's easy to think of consumer electronics and computers as different kinds of things used for different purposes by (sometimes) different kinds of people. But when you stop and think about it, the world of CE and computers overlap in a number of important ways. Consider, for example, digital photography. The ability to take scores of photos and enjoy them in a variety of ways without ever making a trip to have them developed is a huge selling point for digital cameras, but without a computer, a digicam isn't nearly as useful. True, you can print directly from some cameras to specially equipped printers, but what if you want to do some editing first? And, of course, you aren't going to want to leave your photos stored permanently on expensive flash memory cards, so your PC's hard drive and/or CD or DVD burner come to the rescue.

The same kinds of issues exist for digital camcorder users, digital music fans, and a host of others who enjoy consumer electronics. That's why we put together a few articles for this issue that focus on the consumer electronics-related gadgets and gizmos that are part of or work with your PC. Starting on page 40, you'll find helpful setup, use, and troubleshooting advice for your PC's digital imaging, storage, audio, and video peripherals so you can get more out of them and spend less time dealing with the seemingly inevitable bugs they suffer.

This issue also contains a great article on setting up and installing a digital projector for home theater buffs who want a real big-screen experience, more expert photography advice from Brian Hodge on shooting landscapes, and a look at the Internet telephone service called Skype from the creators of the popular file-sharing software Kazaa. If you're a gamer and you're wondering about the next round of handheld gaming systems, be sure and check out "Pocket Arcades" on page 82, and for questions about home network issues, see "Keep Your Home Connected" on page 74.

Enjoy, and thanks for reading.

Chris Trumble, Publication Editor, *CE Tips*

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Installation takes just moments. All IOGEAR Wireless-G products offer the latest security and are backward compatible with 802.11b.

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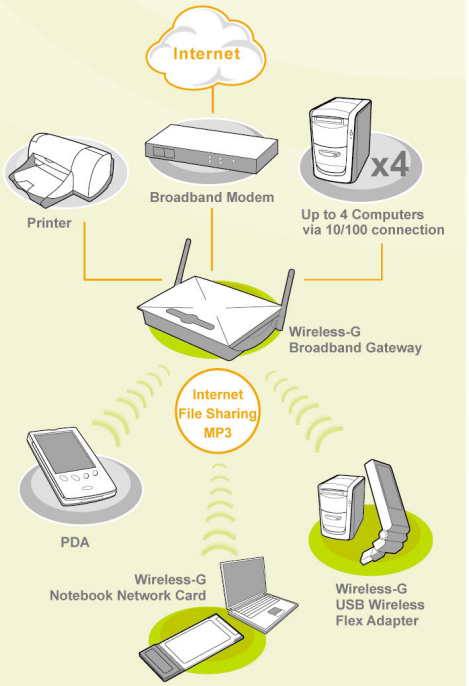
GWU513

Wireless-G to USB 2.0 Flex Adapter

- Uses USB port, not cardbus or PCI slot
- No configuration hassles
- Flexes and pivots for optimal reception



GWA501

Wireless-G Broadband Gateway/Print Server

- Fast setup in just a few simple steps
- Includes everything for effortless installation
- Built-in firewall, supports WPA and WEP
- Built-in print server shares your printer with all connected computers

GWP511

Wireless-G Notebook Network Card

- Low-profile high-gain antenna achieves favorable sleek design
- Included Software Access Point allows you to turn your notebook into a wireless Access Point

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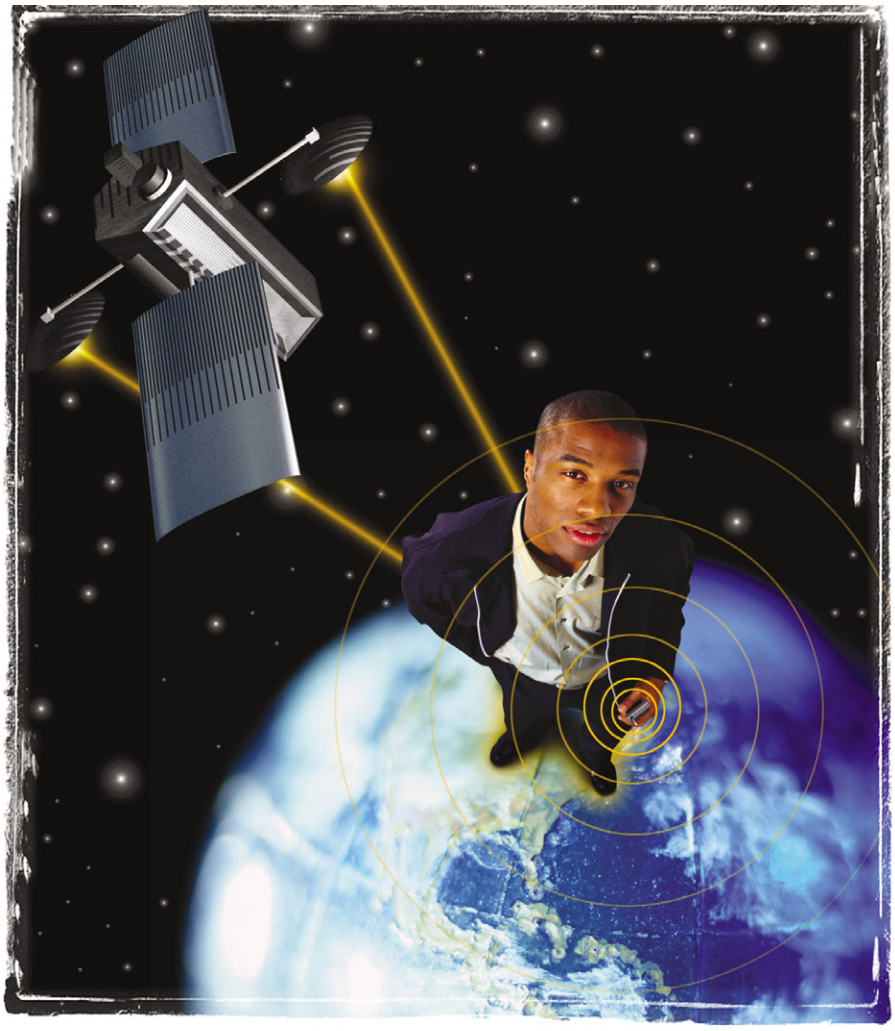
10 Tips On . . . GPS



1 Don't Block Your GPS Device's Access

A GPS (global positioning system) receiver can't function if it can't see the satellite, so position it as carefully as possible to get a clear view to the sky. Move away from trees, buildings, hydro wires, and other people and let the device orient itself before trying to take an important reading. In fact, whenever you change direction as you move, reposition the GPS receiver to give it the best chance of connecting to the satellite signal. GPS devices need a bit of help if they're to give you the quality of information you require.

2 Give It Time To Get A Lock

Your GPS receiver needs the right positioning to get a lock on the satellite's read, and it also needs time, sometimes as much as 20 to 30 seconds. This is particularly true when you first power up the device, at which time the best approach is to stand still in as open an area as possible and let the device acquire its target, to use military jargon. If you don't, you could end up with readings that are inaccurate to a distance ranging from a few feet to over a mile, not exactly useful when navigation matters. When you change position or altitude significantly, allow additional time for locking in.

3 Extend Your Battery Life

Like everything else that isn't plugged into a wall socket, your GPS device eats batteries, especially when you're using it as a handheld away from the car. By all means, carry extra batteries with you—in fact, if you rely on the GPS for navigating, don't even dream of having only one set. You can also help yourself out

by configuring the device to save battery power. Open your options or preferences panels and turn on the power saving option. You might find your GPS device a bit less sensitive to your movements than before, but for most uses the difference will be minimal.

4 Acquire New Waypoints When Changing Locations

It's easy to take your GPS device for granted, so much so that you forget about its fundamental reliance on waypoints. **Waypoints** are saved locations, but because navigation is only relative, and your GPS device needs a fixed point to which to relate, its need for waypoints becomes obvious. So, too, does the need to help your device by giving it the time it needs to acquire accurate new waypoints when you change positions substantially, by a half-mile or more. Wait for several seconds, save the location as a waypoint, and navigate from that location.

5 Give Your GPS Device A Boost With Mapping Software

A program such as OziExplorer ($85; www.oziexplorer.com) for desktop Windows and its Windows CE-based sibling OziExplorerCE ($30) can help you by letting you import digital maps into your GPS device and set up a prearranged route. The software interacts with your device by downloading tracks and waypoints, and you can set your own waypoints and tracks on maps you create yourself. The software supports real-time tracking, reflecting the position of the GPS device as you physically move. Maptown's Memory Map ($111.10; www.maptown.com) is another mapping program with similar features.

6 Buy Some High-Quality Digital Maps

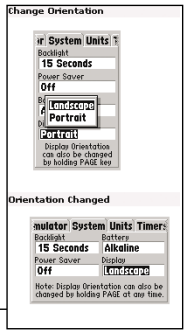
The whole point behind GPS navigation is knowing where you are, but planning where you want to go is also a large part of the technology's appeal. To help with both, but especially the planning, you can buy high-quality maps from a variety of sources and at a range of prices. You have several choices for digital map supplements, depending on your needs and your budget. Land Info (prices vary; www.landinfo.com) provides detailed coverage for the United States (and many parts of the world) with several map types, while Gecko Software (www.gecko-sw.com) specializes in low cost aerial topographical and wetlands maps. You can get trail maps of just about any area of the United States, as well, and even free versions from sites such as TopoZone (www.topozone.com). If you're traveling in Canada, check out Map Town (www.maptown.com), with it numerous topographical maps.

7 Work With Your GPS Device Before Using It Live

If you intend to rely on your GPS unit, learn it before needing it. Just as you should never wait until it's dark, raining, and cold outside before figuring out how to work the lights, wipers, and heater in your car, you should determine how to work your device when nothing's at stake. Get the manual out, work with setting waypoints and determining position, and if your GPS device has a simulator mode, as the Dell GPS III Plus does, work with a simulated navigation situation in the comfort of your home before even stepping outside and locking onto the satellite system. But by all means, practice with the live satellite system, as well, learning how to use the GPS device efficiently before heading for a place where you could be lost for real.

8 Skip In-Between Points

Once you've set up specific routes, your GPS device typically guides you according to the waypoints you've established along each route. Often, however, you can save time and distance by choosing a particular waypoint and directing the unit, via its interface, to skip the waypoints in between and guide you directly to your target. This is particularly true with longer trips that you've memorized because, once established, they use the same route over and over again. In a sense, they need to be deprogrammed to give you more efficient information.



Change the screen orientation on your GPS III Plus from portrait to landscape when you need to see information on charts and don't want to scroll back and forth.

9 Use Trackback Mode To Find Your Way Back

Your GPS device offers a trackback mode that you can enable when you want the device to track where you've been, and therefore, of course, help you get back. This feature would seem an obvious one to use, but like everything else in computerland, it consumes memory, which is always in short supply. Use your preferences or options menu to choose a less memory-hungry means of recording trackback, such as lower resolution or fewer locations, saving the most available memory for the most crucial trackback operations.

10 Set Your Receiver For UTM

The most accurate mapping available is Universal Transverse Mercator, known by its initials UTM. Maps designed for use with GPS devices typically have UTM markings in place, helping you locate your position more easily and accurately than standard angular coordinates. UTM lets you measure according to area, distance, and even shape, and this system is recommended by GPS advocates for most mapping activities. If your GPS device offers a UTM feature, enable it, as long as your maps offer UTM markings. CE

NEIL RANDALL

CE News

Compiled by Tracy Baker

Opera Mobile Accelerator Conserves Smart Phone Bandwidth

If your wireless plan is like those found in most of Europe, charging by the amount of data you transfer and not by airtime, Opera's Mobile Accelerator ($13 for a three-month subscription; $31 for a 12-month subscription; www.opera.com) is an investment that may save you a lot of money in the long run. You don't need special software to use this service other than Opera's mobile browser because it relies on an Internet proxy to do its work. Subscribers navigate to www.opera.com/proxy and surf the Web through that site. The proxy site then applies aggressive compression to all pages, graphics, and other files that the phone accesses before that data passes through the phone network. The end result is that anywhere from 20% to 90% less total kilobytes of data are transmitted, cutting costs for pay-per-kilobyte subscribers.

Opera Mobile Accelerator may be a smart choice even for those who can browse the Web via a smartphone cheaply because the compressed files download faster than the uncompressed files do, meaning Web pages should theoretically render much faster than normal. ▮

RIAA Takes Aim At Digital Radio

The RIAA (Recording Industry Association of America) is pleading with the FCC to restrict digital radio providers that broadcast over the air. The RIAA argues that digital radio broadcasts let listeners record CD-quality music and pose the same copyright infringement risks associated with digital music files that are shared via the Internet. The difference is there's no way to monitor or control how, when, or if subscribers record broadcasts.

The RIAA doesn't care if subscribers record digital radio broadcasts manually, pressing a record button while listening to a broadcast. The problem is that digital radio broadcasts have track, title, and artist info embedded in them that could be fed into software that records only songs that a listener wants instead of making them sift through hours of recordings. It takes longer than file sharing to get all the tracks, but listeners could accumulate CD-quality recordings

that, the RIAA argues, eliminates the need to buy CDs. Because the recordings incorporate no DRM (digital rights management), the illegal recordings could be distributed over the 'Net in their pure digital form and would be extremely difficult to track.

The RIAA wants to add DRM to digital radio broadcasts, using encryption or ADF (Audio Protection Flag). Encryption requires that a listener's hardware have a decryption chip that can unscramble the digital broadcast for normal listening but apply DRM rules to recording or copying the music. ADF tells listeners' hardware that the broadcast is copyrighted and forces the hardware to automatically apply rules regarding recording or copying the broadcast.

Both methods require that digital radio manufacturers install special equipment in their hardware, and although it is unlikely any manufacturer would voluntarily comply, they may be forced to comply if the FCC sides with the RIAA. ▮

TI Announces High-Definition Headphone Driver

With so many new speakers flooding the market, headphones don't get the attention they deserve, but the specifications for Texas Instruments' (www.ti.com) new TPA6120A2 headphone driver simply demand audiophiles to sit up and take notice. Properly amplified, the new driver supports a dynamic range of greater than 120dB (decibels)—more than the human ear can hear—and has a signal-to-noise ratio of 120dB.

This enormous dynamic range makes the TPA6120A2 the perfect match for headphones designed to reproduce the most possible audio information from HD audio sources such as SACDs and DVD-Audio discs. Currently, no devices incorporate the new chip, but look for headphones, microphones, and other devices that contain the chips by the end of 2004. ▮

First Wireless Worm Wriggles Onto The Scene

Smartphones are a lot like miniature computers. They have processors, memory chips, OSes, and applications. Those similarities coupled with two-way data transmission capabilities also unfortunately make the devices susceptible to the viruses, worms, and other malicious programs that plague computer users, as the world found out with the June appearance of the Cabir worm.

Cabir is a **proof-of-concept worm**, meaning it has not yet (to anyone's knowledge) escaped "into the wild," but it represents the sort of threat smartphone users may face in the future. The worm doesn't do anything too dramatic; it constantly scans for Bluetooth-enabled devices and attempts to install itself on any other Bluetooth-enabled devices it finds. Antivirus leader Symantec (www.symantec.com) claims the only damage Cabir inflicts is dramatically reducing the battery life of products it infects because of the constant Bluetooth scanning it initiates.

Despite the hype, it's relatively difficult for Cabir to install itself on a smartphone. First, users must accept a message from an unknown Bluetooth device, and even if users are naïve enough to fall for that, they'll still have to bypass a warning message and manually command their phones to install the transmitted infected software. The worm executes automatically once it's installed and launches each time the phone is turned on thereafter, shutting down only when the phone is turned off. It only affects Nokia Series 60 phones, which use the Symbian OS, further curtailing the worm's potential reach. Cabir is nothing to worry about in and of itself (and is easy to remove using the instructions at Symantec's Web site), but it is a knell that all wireless users should heed: Never install anything via a wireless connection unless you know for certain where it comes from and what it is. ▮

Verizon Recalls 50,000 Phone Batteries

If you own an LG-branded TM-510 phone from Verizon, you may want to check its battery. Verizon has recalled 50,000 replacement batteries sold for the phone that turned out to be counterfeit and potentially hazardous. The bad batteries do not have the circuitry that detects when the battery is fully charged, so it can't cut off electricity from the charger. The battery then overcharges, heating to the point where it can scorch the material the battery's resting on or even explode.

Verizon had heard 18 reports of incidents (some involving injuries) with the bogus batteries by June 24, 2004, and it urges users to check the manufacturer/date code on their TM-510 battery to see if it's eligible for a free exchange. Affected batteries have manufacturer/date codes of AEMLLL 02220, AEMMHH 02220, AEMLLL 02X25H, or AEMMHH 02725. The codes are located on the back of the battery beneath the words Model/Modelo or LG on both black and silver batteries. If you have a black or silver battery with one of those codes, call Verizon Wireless toll free (888/351-2121) or visit the battery recall Web page (www.vzwshop.com/lgbattery) to make arrangements for a replacement. ▮

WiMax To Extend Wireless Broadband's Reach, 802.11i To Raise The Shields

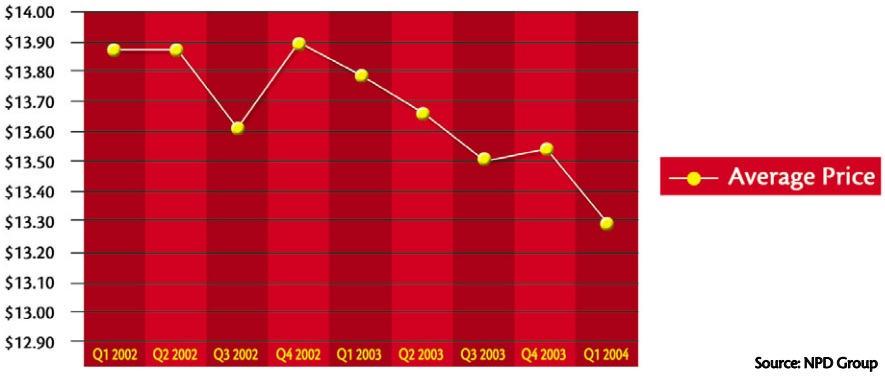
Wireless Internet access may become ubiquitous in the near future, thanks to the IEEE's (Institute of Electrical and Electronic Engineers') June approval of the 802.16 standard, better known as WiMax. WiMax is poised to be the successor to Wi-Fi in urban and rural wireless broadband applications. It boasts theoretical data transfer rates of 75Mbps (megabits per second; almost as fast as the 100Mbps connections used in most wired home networks) and a theoretical range of up to 30 miles. Several companies had already begun manufacturing WiMax products before the standard was approved, despite potential competition from a similar standard such as the faster, shorter-range 802.20.

The IEEE in June also approved the 802.11i security standard that offers much better security and features than do the WEP (Wired Equivalent Privacy) and WPA (Wi-Fi Protected Access) standards used to protect wireless networks today. The biggest improvement is that 802.11i incorporates the AES (Advanced Encryption Standard) protocol, which uses keys up to 256 bits in size to encrypt data, making it virtually uncrackable. The only potential problem 802.11i poses is that decrypting data it creates requires a powerful processor, so adding 802.11i functionality to existing routers via a firmware upgrade will likely be impossible. ▮

Consumer Electronics Marketplace

Average CD Prices Slowly Fall

Price declines for CDs haven't been dramatic overall (and, in fact, they increased throughout 2002), but they now seem to be in steady decline according to a report from the NPD Group's MusicWatch PriceLab. Pressure from file sharing and increased competition in the marketplace are cited as reasons for the decline and are expected to fuel further price reductions. Prices for **catalog** titles (CDs that are more than a year and a half old) have fallen even further to an average price of $12.99.



Source: NPD Group

The Rise Of Online Gaming

A recent In-Stat/MDR report indicates that revenue from online gaming from PCs and consoles combined topped $1 billion in 2003 and could grow to $4 billion by 2008.

Other report highlights:

Average cost per hour to play online games: **>$1**
Average cost per hour to watch television: **13 cents**

Percentage of population that plays online games in 2004: **16%**
Percentage of population that will play online games by 2008: **50%**

Number of people playing SOCOM II: US Navy Seals: **1 million**
Combined hours per week SOCOM II: US Navy Seals is played: **2 million**

Annual cost to play MMORPG
(Massively Multiplayer Online Role-Playing Games) on a PC: **$150 to $200**
Number of people who play MMORPGs in the United States: **< 6 million**

Annual cost of Xbox Live membership: **$49.99**
Expected number of Xbox Live subscribers by the end of 2004: **2 million**

Tidbits

Benq has announced a new LCD television with a massive (for the technology) 56-inch screen.

Source: Benq

LCD TV shipments, expected to **decline 2%** in the first quarter of 2004 compared to the fourth quarter of 2003, actually increased by 14% to 2.35 million units. Samsung is currently the No. 1 overall LCD leader in terms of sales, with 23.5% of the market compared to LG Philips LCD's 20.8% share.

Source: DisplaySearch

Within two weeks of Sony's decision to slash the price of the PlayStation 2 from $199 to $149, sales increased by **200%**.

Source: Sony Computer Entertainment America

Sharp's newly announced DV-HRD200 DVD recorder comes with a 400GB hard drive that stores more than 30 hours of high-definition video.

Source: Sharp

Half of all U.S. mobile phone users want PTT (Push-To-Talk) capabilities built into their phones.

Source: Strategy Analytics

Software sales for the PlayStation 2, GameCube, Game Boy Advance, and Xbox have totaled a combined **$14 billion** since 2000.

Source: NPD Group

By the time you read this, more than **160 million** Bluetooth-equipped devices will have shipped.

Source: Gartner

IT'S SHOWTIME

Talk about box office hits. Verbatim's new DigitalMovie™ DVD recordable media is so hot you can almost smell the popcorn. Available as DVD-R or DVD+R, this 4X speed DVD media looks – even feels – like a Hollywood movie reel. But don't think you need a director's chair to use them. These mini-reels are perfect for home movies, business presentations, transferring files – anytime you want to add a little fun to the show. And of course, DigitalMovie DVD has the same unsurpassed performance and reliability you've come to expect from Verbatim. So make your next show a feature presentation. DigitalMovie DVD from Verbatim. It's the reel thing. For more information, contact us at 800-421-4188 or online at www.verbatim.com.

Verbatim

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A Look At The Latest Consumer Electronics

Multitasking is the name of the game in home computing. But consumer electronics can play that game, too. These new products all do more than one thing, making us more productive (and busier) than ever.

BY *Gregory Anderson*

Pioneer HTD-645DV

$700
www.pioneerelectronics.com

Are you tired of speaker cables that make your family room look more like a wiring cabinet than a home theater? Pioneer's new wireless home-theater-in-a-box cleans up the clutter. The HTD-645DV delivers surround sound from a single wireless rear speaker, fed by a transponder connected to the included receiver. The system puts out 650 total watts (peak power) and includes regular wired front speakers and a subwoofer in addition to the wireless rear. The built-in DVD player supports both DVD-Audio and SACD formats, and the five-disc carousel lets you stay sprawled out on the couch between discs.

Airport Express With Air Tunes

$129
www.apple.com

Wireless music streaming doesn't get much easier. Apple's new wireless router cum media center acts as an 802.11g access point or as a wireless-to-stereo iTunes adapter. Just plug in a mini-to-RCA or mini-to-digital optical converter cable and connect to any music system. Your networked computer (Mac or PC) running iTunes automatically finds Air Tunes and sends it music. Ethernet and USB ports also let the Airport Express serve as a broadband router or wireless print server.

Concord DV2020

$229.99
www.concordcam.com

Talk about multitasking. Concord's DV2020 isn't merely a 2MP (megapixel) still camera. It's not just an SD (Secure Digital) card-based digital camcorder or a PC-based Web cam. It does more than play MP3s, and it's not limited to digital voice recording. In fact, it does all those things. The 5-in-1 device may not be a world beater in any single function, but you certainly can't argue with the convenience of having so many things in a single case.

Hitachi DZ-MV580A

$899.99
www.hitachi.us

Hitachi pioneered direct-to-DVD digital camcorders, and its latest model takes the genre a step further. It films in native 16:9 format with standard DVD MPEG-2 (Moving Picture Experts Group-2) compression. Choose between rewriteable DVD-RAMs or write-once DVD-Rs for either PC transfer or playback in commercial players. DZ-MV580A features on-camera editing in DVD-RAM mode, and the 1MP still camera also saves its images to MMC (MultiMediaCard) or SD (Secure Digital) storage.

Panasonic DMR-E85HS

$699.95

www.panasonic.com

Panasonic's DIGA line of DVD recorders just took a giant leap forward. The DMR-E85HS is more than just a DVD-R/DVD-RAM burner in a sleek box. It also packs a 120GB hard drive, adding DVR functionality to its archiving ability. The TV Guide Online programming guide lets you search and schedule, and you can time-shift live television by recording to either the hard drive or a DVD-RAM. And archiving won't take forever; the DVD-R recording proceeds at a brisk 24X.

Creative Zen Touch

$269.95

www.creative.com

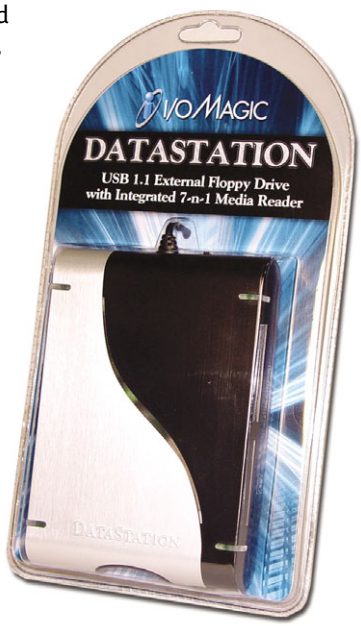
Has an iPod killer finally arrived? Creative's latest music player has the small size and sleek styling to compete. It's not only less expensive than competing players, but also it plays MP3 and WMA (Windows Media Audio) files, extending its 20GB capacity to 10,000 songs. Zen Touch doesn't require any special software to transfer music and acts as an immense portable hard drive. Best of all, its 24-hour battery life won't tie you down.

I/OMagic Datastation

$79.99

www.iomagic.com

As portable storage goes, it doesn't get much more versatile than this. Billed as a "USB External Floppy Drive," the Datastation is so much more. Sure, it will let you access legacy data on those old floppy diskettes. But it also includes a 7-in-1 card reader that supports CompactFlash, Microdrive, MMC, SD, Memory Stick, Memory Stick PRO, and Smart Media cards. It's powered through its USB connection and is compatible with all Windows versions since Windows 98 SE. Floppy drive *indeed*.



AT&T E5965C

$199.95

www.telephones.att.com

5.8GHz cordless phones aren't getting any cheaper, but they are adding cool new features. AT&T's newest model is a case in point. The full-color LCD introduces picture caller ID, customizable wallpaper, and an easy-to-read menu system. Audio components add polyphonic ringtones and speakerphones in both the handset and base. The 100-entry address book and caller ID memory mean you won't lose numbers anymore. The system is expandable to eight handsets, so you don't have to worry about having a phone jack nearby. And, even if you don't make it to the phone in time, the E5965C includes a built-in answering system.

Integra DPC-7.5

$350

www.integrahometheater.com

It's not every day that a manufacturer such as Integra offers a deal like this. The company's six-disc DVD changer improves on standard playback with high-quality processing and Direct Progressive playback, which passes unadulterated progressive scan signals to the component outputs. Outputs include both RCA and BNC component connectors, plus S-Video and composite jacks.

Shuffle

Getting Rid Of Local Phone Roadblocks

Commentary by
Sascha Segan

When I was a kid, making a long-distance call was a big deal. My parents would herd me and my sister over to the phone, and we'd take turns saying hi to Aunt Eve in San Francisco, knowing some ungodly amount of money was draining down the line.

Nowadays, I call my buddy Christy in London whenever I feel like it, for 10 cents a minute. Americans take low long-distance rates for granted, a benefit of the breakup of AT&T way back in 1984. Local rates, though, have been much slower to drop.

That's because local phone service stayed a monopoly, in the hands of "Baby Bell" companies like Verizon and SBC, until 1996. The Baby Bells (and a few oddballs like Sprint in some cities) own the copper wires running into your house, and it's pretty much impossible for competitors to run new ones. There's just not enough room under streets, and it'd take billions of dollars to run lines anyway. Cable companies have done it, but they were protected monopolies when they ran their lines.

So in 1996, the federal government ruled the Babies would be forced to share their lines at wholesale rates with new competitors. The cry-Babies have been fighting against competition ever since.

Phone geeks love weird acronyms, but the one they use for the Baby Bells is fitting: Regional Bell Operating Companies collapses to "RBOCs." Read that as "Roadblocks." Their opponents, the MCIs and Z-Tels of the world, are Competitive Local Exchange Carriers, or "CLECs," because you'll collect lots of savings when they come to town.

Where CLECs do business, they've cut consumers' phone bills by an average of $15 per month, according to a 2003 study by the CFA (Consumer Federation of America). And competition is spreading; by 2003, 15% of Americans had chosen CLEC options like MCI's "Neighborhood" local/long distance package, the CFA says.

Alas, a March federal court decision imperiles that competition. The federal court refused to force the RBOCs to open their broadband Internet lines to competitors, struck down some of the regulations giving competitors cheap access to local phone lines, and left the rest up to the FCC. Experts called the decision an "uncertainty quagmire" and a "litigation bonanza." The Bush administration has decided not to challenge the decision.

The RBOCs' backers think the phone companies should negotiate access fees. But asking the Baby Bells to "negotiate" with their smaller competitors is like asking that beefy seventh-grade bully to "negotiate" with your 60-pound 9-year-old over his lunch money. We've already started to reap the whirlwind of unchallenged RBOC supremacy: In late June, AT&T announced it was pulling out of offering competing local service in seven states.

Cutting The Copper Cord

A few brave souls aren't getting their local phone service through a dedicated copper wire. Wireless-only folks and VoIP (Voice over Internet Protocol) customers aren't going to be a major market force for a few years now, analysts say, but VoIP, especially, offers a potential way to break those copper chains.

Going wireless may look attractive, and 5% of Americans had done so by this February, according to research firm InStat. But wireless phones aren't (yet) anywhere near as reliable as landlines. And the nation's two biggest wireless companies, Verizon and Cingular, are Baby Bells interested in keeping their landline services healthy, too.

VoIP, on the other hand, could totally redefine the phone. Imagine a world where dozens of competing VoIP firms sell different boxes with slightly different rates, all of which work together. That'd be phone nirvana.

But the CFA's Mark Cooper envisions one nightmare future where broadband ISPs block any VoIP service they don't approve of. As most people right now only have two real broadband options in cable and DSL (Digital Subscriber Line), it would only take a wee little bit of big-ISP collusion to kill the VoIP revolution before it grows.

What can you do? Try to get the FCC and the president to change their minds and support local phone competition. Tell them to back consumers rather than a tiny cabal of incumbent phone companies. Email FCC chairman Michael Powell at Michael.Powell@fcc.gov and send a copy to Attorney General John Ashcroft at AskDOJ@usdoj.gov. You don't even have to pick up the phone. CE

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Extreme CE

When Money Is No Object

Black must be the new black. Don't let simple styling fool you, though. These high-end models are anything but plain and boring on the inside.

COMPILED BY GREGORY ANDERSON

Runco PL-50XA

$15,995 • www.runco.com

For all you mountaintop oracles waiting to get your over-enlightened mitts on a plasma TV, Runco has the answer. Its new PL-50XA High Altitude Plasma Display works at altitudes higher than 9,000 feet, unlike traditional plasma models. But that's not all you get for the price. High-def resolution, 3:2 pulldown (see this month's "Dejargonator" on page 33), and DVI/HDCP (Digital Visual Interface/high-bandwidth digital content protection) connectivity give an edge to substance over style, though the 50-inch screen and 4-inch depth thicken the plot. Thankfully, you don't need to achieve true consciousness before tuning in at any altitude.

XLO Electric UE-5B

$5,750 for 10-foot length • www.xloelectric.com

XLO's plain-looking speaker cables pack quite a punch. The 6.5-gauge wire is Teflon-coated and contains six (model UE-5) or seven (model UE-5B) conductors. The cable works with single-wired, bi-wired, or tri-wired systems and cuts an unimposing profile even if you don't hide it behind the baseboards.

Alpine SPX-Z18T

$3,500 • www.alpine-usa.com

This three-way component speaker set is part of Alpine's F#1Status flagship line—and for good reason; a pair of 7-inch woofers, dual 4-inch midrange speakers, and two 1.5-inch tweeters handle 200 watts of peak power (50W rms [root mean square]) with a frequency range of 35Hz to 60KHz. Better yet, the three-way crossover network routes frequencies based on your custom settings. Stealthily hidden behind your car's panels, these speakers sure won't sound plain.

Sonance Trio Triple Tuner

$850 • www.sonance.com

Don't call it a radio. More than just a tongue twister, Sonance's multizone model actually incorporates three independent tuners (two FM, one AM). Each has 45 presets for lucky folks with 135 stations on the dial. Embedded RDS (Radio Data System) technology lets you search by program format or call letters in addition to frequency. It's even svelte—just one rack-space high—so it won't dominate your system.

Sony Qualia 016

$4,700 • www.sony.com/QUALIA

Sure, there isn't much to Sony's new Qualia digital camera. But who says big is beautiful? This simple-looking device crams tons of intriguing technology into a 2-ounce case that's just 2 inches wide (and less than 1 inch high and deep). A unique touchpad system lets you choose among options, including digital zoom and playback (on the tiny LCD). A 2MP (megapixel) CCD (charge-coupled device) snaps four images, combines them to optimize quality, and records the results to Memory Stick Duo media.

GADGET Envy

Light Our Fires

Compiled by Sascha Segan

Cool foreign gadgets make our eyes light up, so this month we found some items that give off a rosy glow. None of these gadgets are available in stores in the United States, but you can pick up a few through specialty importers who bring 'em over from Japan.

All Fired Up

The Swiss Army has discovered fire. Branching out from the usual Cro-Magnon cutting, sawing, and clipping tools, the Victorinox Swiss Flame includes a butane lighter in one end, opposite the toothpick (please, please don't mix them up). This knife would be the Transportation Security Administration's greatest nightmare if it were available in the United States, but it's only sold in Europe. Firebugs in the United Kingdom can pick it up for £55.99 ($101.34).

Fairly Odd Watch

Do you have any idea what time this thing is showing? Neither do we, but it's cool, isn't it? The limited edition gold Trip The Light Fantastic watch by PIMP pulses rows of colored lights to show the time. PIMP will only make 500 of these watches in gold, so the ¥18,000 ($162) price actually seems pretty reasonable. The watch also comes in black, but we think you should just trip the dork fantastic and go for the gold. Buy the watch from specialty importer Tokyoflash (www.tokyoflash.com).

Orange Ya Glad . . .

Brits spend large chunks of their summers out in fields with 50,000 other people at "music festivals" which combine all the muddy mess of camping with none of the relaxing privacy. For that crowd, cell phone firm Orange built the Text Me Home Dome tent, which glows orange (of course) when you send a text message to a special phone number. That way, you can tell your tent from the 49,999 other identical, mud-colored hovels. This year, Orange is only giving a limited number of tents to VIPs, but they say they may sell them publicly in the future—not in the United States, of course.

Light Of Love

Violet's Dal lamp is like a grown-up version of the Ambient Orb (see "CE Lite" in our July 2004 issue). Connected to the Internet via Wi-Fi, it changes color based on the weather, stock reports, traffic conditions, Web site changes, emails, SMS (Short Message Service) messages or sounds it "hears" in the room with a built-in microphone. Being French, the developers seem intensely concerned with using the lamp for romance, as you can set it up to shift colors based on keywords in emails. "A personal language and grammar can be created between two persons: Only they know what the lamp is expressing," says the manufacturer. The lamp is available at several French department stores and online at www.violet.net for € 790 ($971).

Dream Theater

We can't control our world, but we can control our dreams—or can we? Japanese toymaker Takara seems to think so. Its Dream Workshop (¥14,800/$133) combines lights, smells, and sounds to help you control your dreams. First, you concentrate on an image, pick some music and a scent to associate with that image, and record a phrase on the built-in voice recorder. As you sleep, the Dream Workshop cycles soft lights, sounds, and smells to bring the image back to your drowsy brain, possibly giving you the dream you demand. Soft lights and music wake you up gently after eight hours, maximizing your chances of remembering your dream.

Dog Talker

Cell phones have screens that glow, so we're throwing one phone in here. Vodafone Japan's V602SH is the first camera phone with an actual optical zoom—a real zoom lens, not the "digital zoom," which is really just a PhotoShop trick common to most camera phones. The V602SH also packs in 2MP (megapixel) resolution (better than any U.S. camera phone) and the Bowlingual dog translation software, so you can take the dog for a walk, have a conversation with him, and snap pictures of the things you see together. The handset's price depends on your cell phone service plan.

Retro Remote

The TV remote control from May-Wa Denki is way too retro to light up by itself, but it controls that big glowing box in your living room. It's designed to look like an old-fashioned Japanese remote, evoking feelings of nostalgia in Japanese Gen-Xers, but the kooky '70s design is great even without the fond memories. Turn the big knob to change channels. U.S. shoppers looking to get one to go with a '70s-style rec room can buy it from specialty importer Audiocubes (www.audiocubes.com) for $39.

Fat Workload?

Low Carb Solution, With Less Bytes!

Scale Down

Lighten your day by accessing your office PC from home and finishing work when it's convenient for you. Imagine… you'll leave the office early, beat rush hour traffic, spend more time with family and avoid going into the office on weekends. GoToMyPC is the ultimate productivity tool, letting you work where you want, when you want.

A Lighter Load

Because GoToMyPC is Web-based, all that is required is a 2-minute, 1.4 MB software download on your PC and an Internet connection. That's it! Simply log on to www.gotomypc.com from any computer, and your PC desktop instantly appears – just as if you were in front of it. Stop carrying your bulky laptop with you. Anything you can do at your PC, you can do from anywhere!

A Simple Solution

Unlike pricey and complicated VPN or packaged remote-access software, GoToMyPC's Web-based technology is self-configuring so it's ready to use right away. No additional software is required and it works automatically with firewalls. GoToMyPC is the easiest, fastest and most secure way to have complete and instant access to ANYTHING on your PC from ANYWHERE.

- Web-based remote access
- Automatic, 2-minute setup
- Pre-configured security features
- Compatible with firewalls
- **FREE** tech support
- **FREE** upgrades for life
- **FREE** 30-day trial period

Who uses GoToMyPC?

David, a senior executive, is tired of working late nights at the office. Chris, a network support manager, wants to spend less time at the office on weekends and more time with his family. And Katie has been on maternity leave, and now would like to work from home. They all need a way to work smarter, not harder.

Need we say more?

"The remote-access star is GoToMyPC."
— PC World Magazine, Editors' Choice

"You'd be nuts not to sign up!"
— CNET, Editors' Choice

"It makes life easiest for its users."
— Laptop Magazine, Editors' Choice

"First-rate security."
— ZDNet

"GoToMyPC is the most useful tool."
— eWeek

"The easiest remote-access tool available."
— Computer Shopper Magazine

"Highly useful, very easy and quite reliable."
— Smart Money

"For remote access, GoToMyPC is far out!"
— Fortune

"It worked flawlessly."
— The Wall Street Journal

"An impressive tool."
— The New York Times

Can I try it free?

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Visit www.gotomypc.com/smart and get started now.

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A/V Project

Install A Home Theater Projector

When most people think of high-definition TVs for their home theaters, they conjure up images of large, flat plasma or rear-projection DLP (digital light processing) TVs. But there is another high-def option you shouldn't overlook: a high-definition TV projector. Once limited to boardrooms and traveling sales presentations, projectors are increasingly finding their way into family rooms and home theaters around the country. To truly replicate the cinema experience, front projection may be the best way to go. Projection TVs typically cost less than large plasma TVs and can create a screen that's 100 inches or more (if your room is large enough to accommodate such a screen size). But it won't do to trick out a home theater room and just set your projector on the coffee table. We'll walk you through the process of mounting an HD projector from the ceiling. It isn't as hard as you might think, and with a little time and a few tools, you'll have an A/V project worth bragging about. You may even be able to charge admission.

Preparation

We'll leave debates about the best type of projector, screen resolution, and luminosity and contrast aside. When it comes to installation, most projectors are pretty similar. Size, weight, and form factor are less important in a fixed installation than in a portable, but (all other things being equal) lighter and smaller projectors are easier to install. In this situation, the position of the projector is the key consideration. A given projector's throw is crucial in this regard. **Throw** is the distance a projector projects an image, and the **throw ratio** determines the image size at a given distance. Compare your room (and seating arrangements) to a projector's range of throw measurements to find a projector that can provide the desired screen size when it's located in a convenient position. The last element is important and easy to overlook. Your room and desired screen size might dictate the projector's location, but if the projector is right above the couch or hidden behind a ceiling beam, you'll have to make adjustments. Your ceiling structure is also important. Mounting on a finished drywall or wood ceiling is easier (and more secure) than mounting from a suspended ceiling, though you can mount a projector to either type of ceiling with the correct hardware. For this project, we used Panasonic's PT-AE500U projector ($2,499.95; www.panasonic.com).

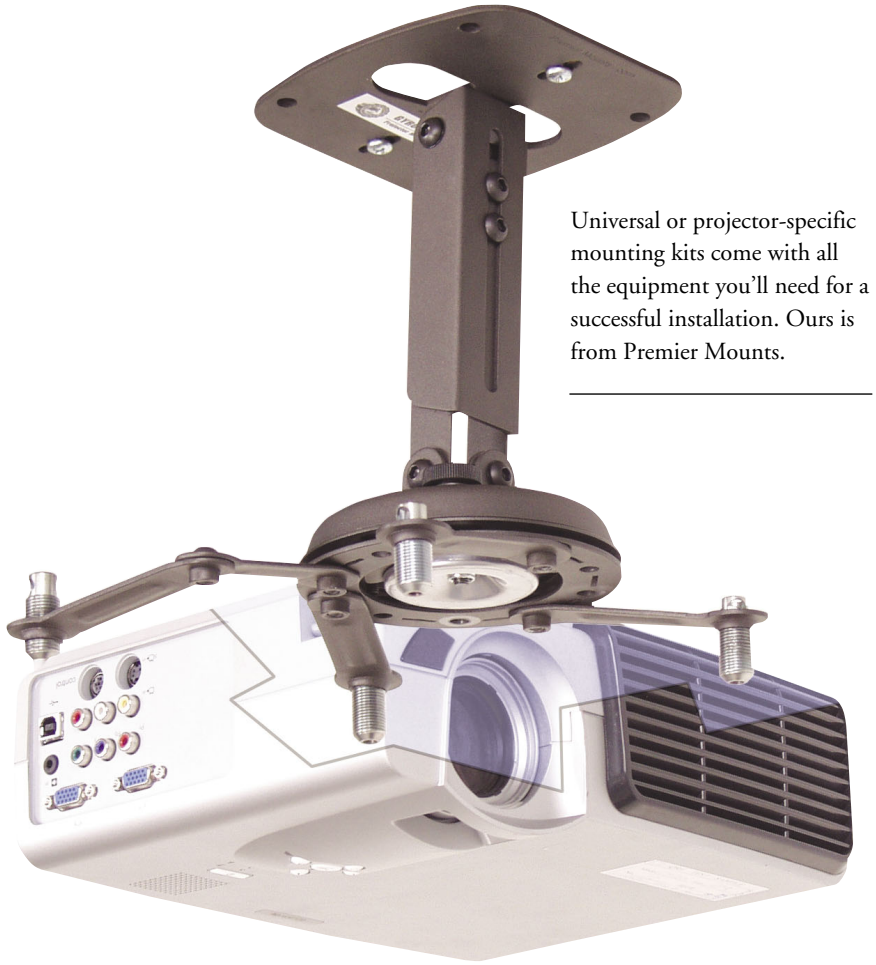
Before you begin, round up all the tools you'll need for the job. Plan to use a tape measure, a drill, some wrenches, and a Phillips screwdriver. Try to round up a partner. You'll need someone to help hold heavy components and handle bulky hardware. Projectors are too expensive to risk dropping while trying to juggle mounting brackets, tools, and cables. Set aside plenty of time for the project, as well, at least half a day. Finally, do some math. Remember the old saying "Measure twice, cut once"? In this case, measure three or four times. Work out the math to determine where the projector's precise location should be.

Mark the desired mounting spot on the ceiling, taking into account the length that the lens will extend forward from the projector's mounted position. It's a good idea to hold the projector in place, turn it on, and make sure the beam is aligned properly on the screen. If necessary, find a compromise among

your desired screen size, your projector's throw ratio, and its position in the room. If you have a high ceiling, invest in a projector mount with an adjustable pipe column in order to drop the projector as low as necessary while keeping it out of the way.

Finally, you're ready to start drilling. There are two basic methods for installing a projector. Shelf mounts suspend a shelf on which the projector sits from the ceiling. This method is safer than hanging your projector from the ceiling, and shelf mounts often make it easier to remove or replace the projector (just unhook cables and lift the unit out of the shelf). This method is necessary for projectors without mounting connectors or models that can't invert their signal.

The more professional (and less bulky) option is to use a plate or column mount. In this model, mounting hardware attaches to secure points in the ceiling and to mounting holes underneath the projector chassis. The unit is suspended upside down, the buttons accessible from beneath, by connecting the ceiling hardware with the bracket on the projector. We'll cover shelf mounts briefly but focus on a suspended mount first.



Universal or projector-specific mounting kits come with all the equipment you'll need for a successful installation. Ours is from Premier Mounts.

Suspended Mount

Each mounting kit and bracket is slightly different. Many projectors strongly recommend using a manufacturer-specific mounting kit, though several vendors offer universal or generic kits compatible with a variety of projectors. Our mounting kit is similar to many, though some models will set up differently.

First, let's check out some places where you can buy a mount for your projector. Mounts and More (www.mountsandmore.com) has a wide selection and great service. We used the PBL-UMS Universal Projector Mount from Premier Mounts ($199; www.premiermounts.com). You can also shop at other online retailers (including www.ritzav.com and www.perfectmounts.com) or at your local A/V retailer, or you can buy the mount directly from the manufacturer.

The essential process for installing all mounts is the same: Connect the mounting hardware to the ceiling, connect the projector to a bracket (except in one-piece mounts where the mounting hardware and bracket are a single unit), and then connect the bracket to the ceiling mount. We'll walk through each of these steps.

For a drywall or other solid ceiling, locate the ceiling joists with a stud finder. See if you can install the mount directly to the joist while maintaining the projector's required position. If so, attach the mounting hardware (usually a plate or slotted box of some sort) through the ceiling directly into the joist. If you can't match the projector's necessary location with a joist, sand and paint a plywood board large enough to attach across at least two joists. Screw or bolt the board into place through the ceiling and then attach the mounting hardware to the board. In each case, test the weight-bearing ability of the installation with a similarly heavy (and less expensive) object before attaching the projector.

Next, connect the bracket to the mounting holes on the underside of the projector using the screws or pins provided. Brackets with fixed arms or pins must align perfectly with the projector. Universal mounts often have adjustable arms, which you can adjust to your projector's layout. After you attach the bracket to the projector and install the mounting hardware on

the ceiling, connect the two. Usually, a system of thumbscrews, pins, or notches connects the bracket to the mounting hardware, making it easier to adjust or remove the projector. Some models, however, bolt or screw the two parts together. Either method is fine, as long as the mount supports the projector's weight and you're careful to connect them securely.

You can find specialized hardware to mount a projector from a suspended ceiling, or just use the plywood board method (described above) with a simple twist. Instead of installing the board outside the ceiling (attached to the joists), position the board above the ceiling, resting across several support strips. For very light projectors, this setup may be enough support to attach the mounting hardware to the board above (through a hole in the ceiling tiles). For heavier projectors or for extra support, wire or suspend the board from the same beams or joists from which the ceiling is suspended. Attach the bracket to the projector the same way as for a solid ceiling.

Wiring & Adjustments

Once you've mounted the projector to the ceiling, it's time for the finishing touches. First, wire the projector to your home theater system. You'll have at least two, and perhaps three or four, cables to connect: power and component video and S-video or composite video cables if your receiver doesn't upconvert signals to component video. Unless you're installing an outlet in or near the ceiling, you'll need a longer power cord and, most likely, longer-than-normal interconnect cables. Position your components as close to the projector as possible to limit the costs and signal attenuation associated with long cables. Some people locate their component shelf in a back corner of the room, which keeps the black box collection from dominating the view.

You can run wires through the ceiling or attic and down the wall if you're up for it. Install faceplates with the appropriate jacks on both the projector and component cabinet ends with the necessary wires running in between. Or, if you're less ambitious (and more likely to swap out cables), run the wiring along the wall inside a painted conduit or channel to your component cabinet. The wires will still be discreet but much easier to access and install.

Next, turn on the projector and check out the picture. The first adjustment with a suspended installation is to invert the image. Check your projector's documentation for directions. After setting the video right side up, adjust the focus and image to fill the screen. Use the lens shift feature (if available) to adjust for the angle and

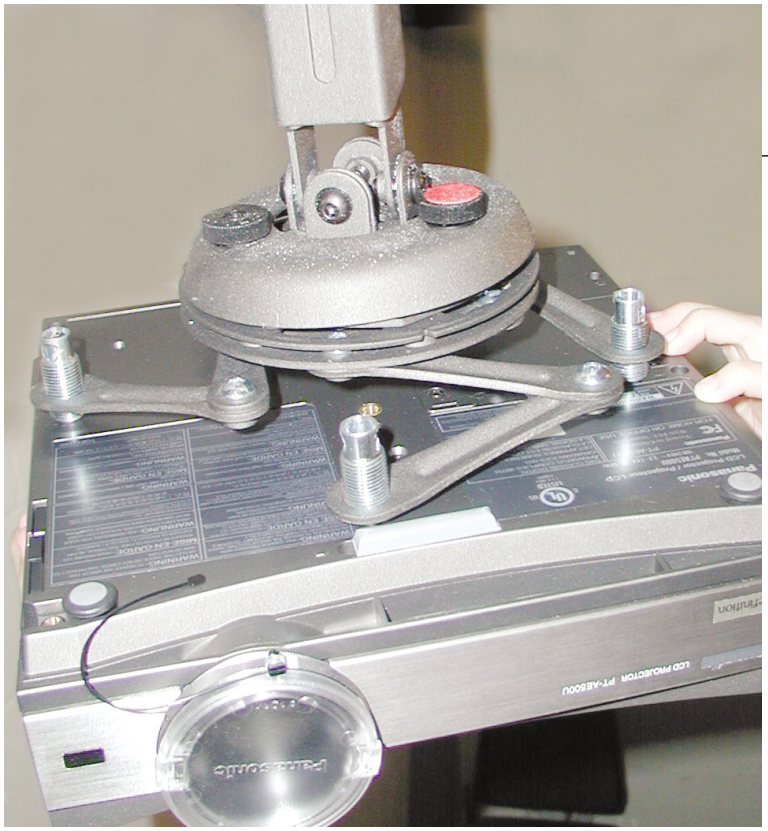
Install the mounting hardware on your ceiling, making sure to connect it to a joist in the ceiling.

Tabletop Options

If you aren't handy or don't have the time for a DIY project, table mount a video projector. It's much easier than installing one on the ceiling. Just invest in an attractive table or stand and drop the projector on top. You may be able to use a coffee table or end table or set the projector on a high shelf behind the seating area.

Wall shelves are also available, providing the out-of-the-way benefits of ceiling mounts without the risk and hassle of suspending expensive electrical components upside down. If you have a room small enough to meet a projector's throw limitations, install the shelf on a wall stud and set the projector up as with any other shelf.

Neither table nor wall mounting are as unobtrusive or professional as a ceiling installation, but both are easier, quicker, and far less permanent than a ceiling mount.



Bring the projector and the mounting unit together by attaching the bracket to the mounting hardware using thumbscrews, pins, or clips.

direction of the projector's throw without sacrificing image quality. If you don't have lens shift (or if your setup requires a more severe adjustment than lens shift can handle) use the **keystoning** adjustment. The keystoning adjustment restores a trapezoidal image (resulting from severe projection angles) to a rectangular shape. Keystoning adjustments involve processing the signal, though, so it can degrade image quality. Finally, work through the projector's setup and menu systems to optimize image quality for your room and video components.

Install A Shelf Mount

A shelf mount provides a ready-made platform on which your projector can sit. Popular manufacturers include Da-Lite ($130; www.da-lite.com), Draper ($275; www.draperinc.com), and Peerless Industries' various models (from $215; www.peerlessindustries.com). The projector's buttons will be inaccessible because of its orientation on the shelf, so you'll have to rely on the remote control. But you also won't have to worry about inverting the projector's signal or detaching it from its mounting hardware if you want to take the projector somewhere else.

Installing the hardware for a shelf mount is the same as the process for a suspended mount. Find a ceiling joist, attach the ceiling plate or mounting hardware, and position the shelf appropriately. Set the projector on the shelf, secure it with any included straps or supports, connect your power and video cables, and enjoy.

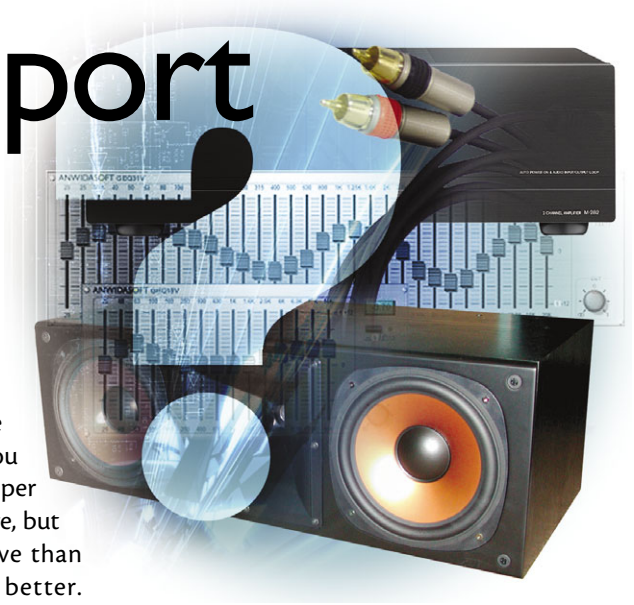
A projector-based home theater system should provide years of enjoyment and impress all your friends. And you can tailor the system precisely to your needs. With the right equipment, a ceiling-mounted system will provide the very best in viewing options and clear up loads of room space. And you can have the full theater experience without your shoes sticking to the floor. CE

BY GREGORY ANDERSON

A cause for celebration—the successful completion of another A/V project.

Hi-Fi Tech Support

Fix The Old Components Even As You Add New Ones



You've no doubt run into problems with your A/V equipment. Here, we'll talk about a few of the more prevalent problems with speakers, receivers, turntables, tape players, and more, and how to resolve them.

Speakers

Unless you plan to live your life under headphones, you need speakers. Speakers come in all shapes and sizes, but they can all develop problems.

Problem

I get unpleasant crackling sounds from my speakers.

Solution

Numerous problems can give you crackly speakers and even cut off your speakers from time to time. Start with the most obvious problem and work from there. The two most obvious possibilities are speaker wire and volume or tone controls. Speaker wires can get brittle, and their connectors can get dirty and, well, nonconnective. Volume and tone controls can get dirty, as well. This happens frequently with portable audio devices; when you plug in the headphones, you hear only one side of the stereo, or you hear crackly sounds, until you twist the connector to a different position.

There are several solutions to this problem. If your speaker wires don't have connectors at the end (for instance, bare wire attaches to a post on the receiver and the speaker), and the wiring is old, replace it with new wire. For all connections that use connectors, start by cleaning the connections, using either a cleaning solution available at your stereo store or rubbing alcohol and a cotton swab. When cleaning, be sure to get all parts of the connection. With headphone jacks, spread cleaner on the headphone plug and work it into the jack. You can also buy cleaners, with proper applicators, at an electronics store, but they tend to be more expensive than rubbing alcohol and not any better. Finally, if your headphones crackle as you walk or jog, the old spit-and-polish technique performs temporary wonders.

Sometimes, especially in the case of PC speakers, you can't fix the problem. If the speakers are under warranty, return them, but this isn't usually the case by the time the noise sets in permanently. You might have to buy new speakers.

Problem

I just bought high-powered, expensive speakers so I could listen to music. But I don't notice much difference between them and my old speakers, even though the specs are more advanced.

Solution

You usually can't replace one component of an audio system and gain substantially in sound quality. In fact, you can do so only if the replaced component was significantly below the other components in quality to begin with. You need to balance your components so that they complement one another. For instance, your super-powered new speakers won't do much for you if you attach them with old, thick wires to a tuner that barely powered a pair of small bookshelf speakers 18 years ago. Your beautiful new amplifier won't improve anything if you're feeding it through that old, wonky tuner.

Problem

I listen to music through PC speakers because they're small and give a pretty nice sound. Lately, I've noticed that my older music sounds like I'm listening to the vocals through a tunnel. Should I buy an older-style stereo system with a separate receiver and speakers?

Solution

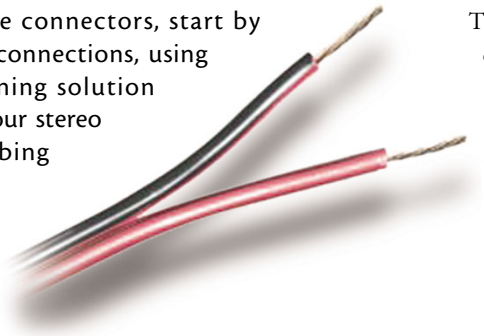
If you want good quality sound, opt for a separate receiver/amplifier and standalone speakers or a powered monitor speaker (expect to pay $600 or more for a pair) that comes with its own equalizer. PC speakers are great, and convenient, but most of them (those that sell for less than, say, $200) aren't designed for the richness demanded of a good receiver and speaker combination. And you don't have to run out and buy a new set if you have your old stereo equipment stored somewhere. Audio equipment has advanced over the years, but if it was decent back then, it probably still is.

Problem

My speakers seem less "out there" since I've moved them. They don't have the same sharpness, volume, or what I call "presence." They sound muffled.

Solution

You may have damaged a speaker while moving it, but they may be **out of phase**. Your speakers work together to



This speaker wire helps you establish phase by clearly distinguishing between the positive and negative wires. Many wires have a much more subtle distinction.

create a sound field, with sound engineers using this field to place sounds at specific locations according to how the recording has been designed. Out of phase speakers lose the sound field, resulting in a flatter sound. Essentially, one speaker cancels the other. You can perform a test for phasing by adjusting the balance control while playing music; if the bass gets louder as you isolate one speaker or the other, and softer when both are playing, your speakers are out of phase.

With a stereo system, this situation results from connecting the positive and negative speaker wires to the wrong terminals on one speaker or the other. Rewire to ensure that positive goes to positive and negative to negative for both speakers. It's more complex for surround-sound systems, but typically surround systems have a decoder that corrects the problem or helps you do so. It's important, in a surround-sound system, to buy speakers and components that have been designed to work together.

Problem

My upstairs neighbors keep complaining about the noise, and we even have the same musical tastes.

Solution

It's hard to restrict sound. If your eyes aren't in the right place, you can't see something, and if your hands aren't in the right place you can't touch it. But hearing operates less directly. You can choose not to see something, but it's harder to choose not to hear something.

Nevertheless, you can help the situation by making it less likely your neighbors will hear your stereo. First, turn down the bass, especially midrange bass, aka booming bass. Bass travels especially well up and down, and it's the most likely thing to annoy your upstairs and downstairs neighbors. Second, get your speakers off the floor, especially an uncarpeted floor. Buy speaker stands to raise them a few inches or put squares of carpet under them. If you want to take soundproofing further, you can wallpaper your room with cardboard egg cartons (they really work!), hang drapes or wall hangings, and bring in additional soft furniture. Absorb the sound to keep it in the room as much as possible. This also changes the dynamics of the sound, so you'll need to experiment.

You can see the balancing mechanism on the far end of this Graham tonearm.

This is a standard coupler for extending stereo cable length by joining two together. The gold plating provides a better connection than other metals.

Problem

One of my speakers seems to rattle whenever I turn the volume up high.

Solution

If you're lucky, your speaker is causing something unrelated to the audio system to rattle around. Check to see if anything in the room (lamps, knickknacks, candleholders, for example) is making this noise and also check anything hanging on the walls. If the rattle continues, you may have blown a speaker. Speakers blow when you feed them too much power, either for a sustained period of time or too much for a brief duration.

Speakers are designed to handle only a specific amount of continuous power (the rms [root mean square] rating) and a specific, higher level of occasional maximum power (peak rating). Assuming the speaker and amplifier are matched in rms and peak capacities (make sure they are), running the amplifier at more than half volume or so may cause problems because you exceed the rms rating and cause distortion. The amplifier starts clipping, which high-range speakers (tweeters and midranges) can't tolerate for long. You can blow your bass speakers by overpowering them, and if you do that, you'll know it. Often you can tear the speaker itself (a lot of air comes out of a bass speaker), and your sound takes on an annoying flapping sound.

If you've blown a speaker, you can replace it by buying a new one. Often, however, you're better off buying a new pair, especially if you can't find an exact match to your remaining speaker. Mixing and matching speakers often doesn't work because for maximum effectiveness the specifications for both need to be practically identical.

Turntables

Once, turntables were king. Today, they're still the only way to play all those vinyl records people own. (Vinyl was still king 15 years ago.) But they were eventually replaced, by tapes to a degree and by CDs, because they're finicky and troublesome.

Problem

I discovered my parents' record collection and bought a turntable off eBay. But sometimes, the turntable's arm bounces out of the groove while playing.

Solution

Welcome to turntable-land. Marvelous pieces of equipment, and still in some ways the best-sound audio reproducers of all, turntables have quirks. Try adjusting the weight of the tone arm. At the back of the arm you'll see a counterbalancing weight that you can turn either way to increase or decrease the force of the stylus on the record. Give the stylus

This Denon receiver features numerous audio inputs.

just enough weight to stay inside the grooves; too much force and you can damage both the stylus and the vinyl.

You may discover, however, that the records are dirty, and the dirt in the grooves is dislodging the stylus (which is better than having the stylus act as a snowplow in an attempt to remove it). Back in vinyl days, lots of recommendations appeared for how best to clean your albums (including using your dishwasher, believe it or not), but the tried and true method is a very soft, slightly damp cloth, maneuvered gently along the grain of the grooves, after which, let the vinyl dry completely. If the problem is caused by encrusted peanut butter, do what you can to remove it. Of course, vinyl records scratch easily, and if a scratch is the cause of the bouncing, there's really nothing you can do about it.

Tape Players

Tape players had their own strong market share at one time, ideal for people who didn't like caring for vinyl records and for anyone who wanted to listen to their favorites in the car. But like turntables and records, they had idiosyncrasies. If you're using a tape player, you still have these issues.

Problem

My tape deck eats my tapes.

Solution

Buy a tape head cleaner, use it as instructed (lots of people don't), and see if that solves the problem. If not, you might need a new tape deck because the motors may be malfunctioning. If you feel like experimenting and your tape deck has outlived its warranty, you can open it and attempt to repair it by replacing the drive mechanisms (including any belts), but the chance of actually making a successful repair in this manner is low because unless you know electronics and motors these things are frequently down for the count once something goes wrong. But by all means clean everything from inside to outside and then see how the deck functions. For testing, however, be sure to use tapes you can live without, in case something goes wrong.

Miscellaneous

Some problems defy easy categorization, so this section is a catchall for audio problems.

Problem

I want to move my CD player and receiver farther apart. I have three sets of stereo wires that'll be long enough if I join them. Does splicing cause problems?

Solution

Splicing them, which means stripping the plastic off the wire and physically connecting the wires, ideally bonding them with solder, is better than buying couplers. Couplers offer convenience by letting you make short wires into longer wires, but with each coupling, you lose some of the signal. The best way around the problems with spliced wires is to go out and buy single stereo cables to reach the full distance, but if you know how to splice, give it a try.

Problem

I listen to music on TV via my digital cable box more than I listen to CDs. Can I run my TV's sound through my stereo?

Solution

Yes. You have two choices: Connect the TV or the cable box to your audio system. You'll need audio output jacks in one or the other; composite video or S-Video jacks won't work, as they handle only video. If your TV and your cable box (or satellite receiver) allow audio output, decide which set to use based on how you use your TV. Connecting the cable box to your audio system means you hear what's coming out of it and not the TV; this is fine when you watch TV, but if you have a game console or a DVD player hooked up, you won't be able to hear it. In those cases, use the output jacks on your TV. If your audio system has multiple inputs, connect the DVD player and game console separately, switching as you wish. Here, we'll assume either the TV or the cable box or satellite receiver are the only two possibilities.

In either case, run a stereo patch cord (available at electronic, PC, and hardware stores) from the audio output jacks of either the cable box or the TV to a set of input jacks on your receiver/amplifier. The input jacks are labeled as Input 2, Auxiliary (Aux), etc. Don't use phono jacks; they're designed for turntables. To listen to your TV, activate the input into which you've just plugged the cables and adjust the volume on your audio system or your TV. For full control through your audio system, enter the TV's (and/or cable box's) audio configuration menu and perform two steps: First, turn off the TV's speakers; second, set the output to non-variable (fixed). This way, you'll hear only your good speakers, and you'll bypass the source device's volume control.

Problem

My receiver stopped working. Nothing happens when I press the power button. I tried taking the cactus plants off the top of it (I had them on a placemat), but it still won't turn on.

Solution

Receivers and amplifiers typically have flat surfaces, and there are people who can't abide a flat surface without a decoration on top. People pile books, games, cushions, and who knows what else on top of these things. The problem is, receivers and other components need air. All receivers and amplifiers have vents to allow the heat built up by the interior components to escape and let cooler air in. If you cover these vents, the heat builds, and electronics equipment that runs too hot, including power transformers, will eventually malfunction.

The solution is simple: Don't cover the vents. Even if the unit is back-vented, especially if you play your music with the volume turned up high (the higher the power, the greater the heat), don't put anything on top of it. Give the thing the room it needs for air circulation, and it will purr along much more contentedly.

Problem

Whenever I tune into my teenage daughter's favorite radio station and listen to the current Top 10 hits, the noise coming from my audio system is horrible beyond belief. Is there anything I can do about this?

Solution

No. CE

BY NEIL RANDALL

CE DEJARGONATOR: Reverse 3:2 Pulldown

Video equipment manufacturers must account for the discrepancy between film-based content and NTSC (National Television System Committee) interlaced video-based content. NTSC interlaced video is the standard format used for video content in the United States and Japan and is the basic format most TVs and video output devices, such as DVD players, support.

Interlacing is a process that divides each frame of video into two fields. The first field contains all of the odd rows of resolution, and the second field contains the even rows of resolution. The first field is displayed for 1/60 of a second, followed immediately by the second field being displayed for 1/60 of a second, creating the illusion of a solid frame of video every 1/30 of a second. That means NTSC video runs at 30fps (frames per second; 29.97fps to be exact, but we'll round up for the sake of simplicity).

This is fine as long as you're displaying video on an NTSC TV, but major problems arise when you display film-based content on that TV because movies are filmed at a rate of 24fps. If a film is mapped frame-for-frame into an NTSC video feed, it plays 25% faster because it plays the extra six frames of video per second.

That is unacceptable, so technology called 3:2 pulldown is used to duplicate certain film frames so they fill the entire 30fps NTSC demands. The process of adding additional frames of video is called **telecine conversion**.

DIAGRAM 1

Step 1: Original footage

Step 2: Each film frame is divided into two fields, 1-odd and 2-even.

Step 3: When transferred to NTSC video, the first film frame is displayed using three fields. The first field (1-odd) is repeated. Next, frame B is divided into two fields: 2-even and 1-odd. The process of transferring every odd frame using three fields and every even frame using two fields repeats itself until the entire video is transferred so the pattern continues (3:2).

Step 4: The fields are merged in pairs to construct NTSC frames.

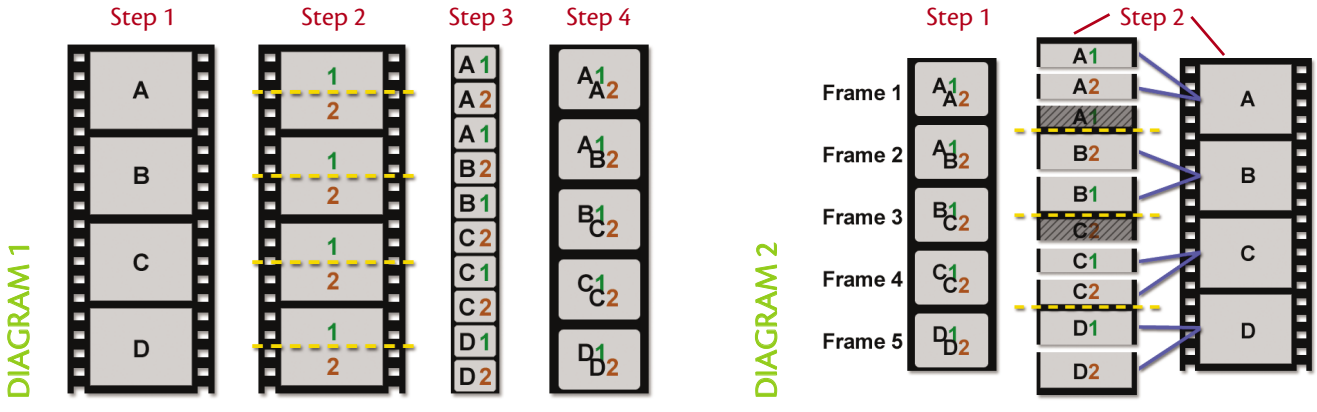
Problem solved, unless **progressive scan** mode is used. Progressive scan is an upgrade from interlaced video in that it displays full frames of video, obviating the need to divide each frame into two fields. When a video device with progressive-scan support encounters video that was created using 3:2 pulldown, it must divide each frame back into two fields and then use that data to reconstruct the original film frames. A device with reverse 3:2 pulldown knows that each frame of NTSC video that was converted from film is repeated using a 3:2 pattern. It extracts the two fields that create each original film frame and then displays each frame using a 3:2 pattern to conform to the NTSC frames per second requirement.

DIAGRAM 2

Step 1: The converted footage needs to have the extra fields extracted.

Step 2: A 1-odd and A 2-even are extracted from Frame 1 and recombined into A. The extra A 1-odd field is ignored, and B 2-even is extracted from NTSC Frame 2 and then combined with B 1-odd from NTSC Frame 3 to create B. C 2-even is ignored in NTSC Frame 3, and C 1-odd and C 2-even from NTSC Frame 4 are combined to create C. D 1-odd and D 2-even are combined from NTSC Frame 5 to create D.

BY TRACY BAKER



Keep The Juices Flowing

Home Theater Power Regulation

The power from your household electrical supply is the first thing that goes into your home theater setup but the last thing we tend to think about when building a home theater system. Everyone has heard of the need to protect sensitive electronics from lightning strikes and power fluctuations, but did you know that one of the most significant improvements you can make to the quality of your home theater (short of buying new gear) is to add some form of power regulation? In fact, it is fair to say that if you put no effort into the quality of your power, even the best equipment won't live up to its full potential.

Power Is Corrupted, Absolutely

First, let's talk power. Most people think that electrical power is to an audiovisual system as gasoline is to a car. The analogy works in the sense that the source of your system's energy comes from the power from your wall socket, but with an important difference. In the case of your car, the gasoline is burned (chemically converted to oxides of gasoline) to release heat, which drives the engine. In the case of your home theater gear, there is no conversion until the very end of the process. The same electrons that come out of the wall run all the way through your electronics and end up in your speakers, where a final conversion to kinetic energy occurs in the speaker drivers.

Think of your home theater gear as an elaborate filtering and modulating system for electric power. If the power is close to the waveform and voltage that your system expects, then you can expect good sound and good video to come out the other end. On the other hand, no matter how good your electronics are, well-modulated garbage is still, unfortunately, garbage. Your power comes to your components through a circuit shared with numerous household appliances, not to mention Mrs. Beasley's Cuisinart down the street and Col. Hardbottom's air conditioner in the next block. Noisy devices can distort your power supply away from the perfect sine wave your system expects, and heavy demand during peak usage periods can alter its voltage.

Another consequence of the straight-through nature of your electronics is that the music that you hear makes variable demands on your power supply. A loud rim shot, for example, requires an instantaneous burst of power that ultimately comes from the wall. If your power is not forthcoming, and you don't have adequate energy stored in the capacitors of your equipment, the sound will be anemic. In the same vein, the music that you hear is a complex waveform consisting of many frequencies playing at once. These also ultimately come through the wall. In a sense, your power cord can be considered part of the musical signal path. If the design of your cord restricts transmission of bass frequencies, say, then your sound will be weak in the bass.

How Much Is Enough?

There is little relationship between the cost of your system and the potential for improvement from power conditioning. Essentially every part of your system can benefit, and the cheapest components may actually benefit the most, as manufacturers often keep costs down by skimping on the quality of the internal power supply. Not that we would recommend supplying a $100 DVD player with a $400 power cord. You are likely to be better off with a better DVD player (besides, inexpensive players generally don't have detachable power cords). On the other hand, if a $400 cord makes your $100 player perform better than a $600 player, then you've just saved $100 and the cord will still be useful when you upgrade the player in the future. ■

Power Conditioning Comparison Chart

Intervention	Result
Contact Cleaner	Improve your picture and sound in five minutes flat.
Upgrade Wall Socket	Cheap and easy, noticeably improves high frequencies and general sound and picture purity.
Dedicated Breaker and Circuit	Also cheap and relatively easy, but don't try this at home unless you know what you're doing.
Power Cords	Only for components with detachable cords. Improvements in sound quality can be huge, but the best cords are outrageously expensive. Only one device per cord adds to cost.
Filtering Power Conditioner	Relatively inexpensive. Provides filtering and often surge protection. Good for taming noisy picture or irritating, bright sound.
Balanced Power Conditioner	Improves vividness, separation, and general fidelity of both sound and picture. Susceptible to voltage fluctuations. Rather expensive.
Active Power Regenerator	Even more expensive, but provides fast, active regulation of voltage and waveform. Probably the only way to eliminate peak use power quality problems.

Outrageous though it may seem, the quality of the power cord that feeds your electronics is one of the major determinants of sound quality. A good cord (and a premium audiophile cord can easily cost more than a premium HT receiver) can transform your sound and your video to an extent that must be heard and seen to be believed.

Most users will benefit from using some form of power conditioning, even if they use components with well-designed power supplies. The quality of a component's internal power supply (the part that converts AC from the wall into DC in your equipment) is critical to that component's performance and is usually the most expensive part of the circuit to manufacture. A $500 price difference between otherwise identical units may often be traced to a better power supply. If your power supply is already top-notch, then power conditioning is less critical. Nevertheless, there is still a bottleneck between the system and the wall. For this reason, even the best components can benefit from power conditioning.

Lightning Strikes & Brownouts

It is said that on average 200 lightning discharges strike the earth every minute. Each of these contains something like a gigawatt of energy delivered over a few milliseconds. This is enough to save a bundle on cremation costs for yourself or your gear. Don't hold your breath waiting for it, however. Urbanites in particular have a very low probability of being struck by lightning, and electronics stores report that returns due to lightning damage are very rare. **Brownouts**, periods of subnormal power delivery from the grid that occur when the system is overloaded, undersupplied, or being brought back online after a power outage, can damage motorized equipment such as the compressor in your fridge through overheating. These are a much more frequent occurrence than lightning strikes but are usually harmless to electronics.

Unlike the first generation of computers and other consumer electronics, most equipment built today is relatively robust with regard to power surges. Hence there has been a decreasing emphasis on surge and spike protection. Nevertheless, this kind of protection, which is found in many off-the-shelf power bars, is a wise form of insurance.

The Monster 7000 HTPS is a bit on the pricey side, but it'll constantly monitor your home theater system's power supply.

Forms Of Power Conditioning

Power conditioning comes in an ever-expanding variety of products and techniques. The most basic technique is to clean your plugs (and all the other contacts in your system) with a contact enhancer such as Pro-Gold or TPC (The Perfect Connection). You can also install a tight-fitting, high-grade socket in the wall outlet that feeds your gear. These outlets include hospital-grade outlets such as the Hubble socket and are available from audio companies such as PS Audio for around $60. Next, you can install a dedicated breaker in your fusebox to create a circuit that feeds only your AV system, but don't try this at home without professional advice.

Power cords. Perhaps the simplest, but not necessarily the least expensive, product for power conditioning is the after-market detachable power cord. These are specially designed cords with carefully selected conductor materials, conductor geometry, and shielding that may also have in-line capacitors and inductors (called networked cables). A variety of manufacturers do a brisk business in these products, including Monster Cable Products, Transparent Cable, MIT, Cardas, and many others.

A high-end power cord, such as this PowerLink MM cord from Transparent Cable, can give your electronics a boost in quality.

These cords will only work on devices that include a detachable power cord. These have an IEC (International Electrotechnical Commission) power socket on the back, of the type commonly found on computers. You simply take off the cheap cord that comes with the equipment and replace it with your aftermarket cord. Startling improvements await you in bass reproduction, tonal purity, sound separation, and video quality, as well as a lowering of the noise floor. The first components you should upgrade are your receiver and amplifier, followed by your source components.

Detachable power cords can cost hundreds or thousands of dollars. How much should you spend? That's up to you. You are well-advised to get used to your system as is, then borrow a few cords, if possible, and gauge the difference in sound and video quality. Money spent on high-quality cords is rarely wasted, as they never wear out and can be used on future gear. If you are the kind of person who can't stand not getting the most out of your equipment, then bite the bullet and buy superior power cords. It is cheaper to buy an outrageously expensive cord once than to start with an inexpensive cord and upgrade several times.

Power bars. Most people find that they need some kind of power distribution for their home theater as there simply aren't enough outlets to go around. You are well-advised to feed all of your components from the same wall socket to avoid **ground loop hum** (hum arising from different potentials at the ground pin of different components). The simplest power distribution option is an audiophile-grade power bar such as the PS Audio JuiceBar

($199; www.psaudio.com). It has a detachable power cord so you can feed it with an after-market cord, and six hospital-grade outlets with oxygen-free copper internal wiring. We've heard the difference this product makes, and it is impressive. The unit has no surge or spike protection, however, which the manufacturer says is because such protection interferes with the purity of the sound.

For a power bar with surge protection, the Monster Cable HTS2000 Mk II ($250; www.monstercable.com) offers 12 outlets with power line noise rejection. The unit also isolates components from one another, which prevents noise cross-contamination. This bar also features three pairs (In/Out) of protected coaxial connections and one pair of protected phone jack connections that will isolate your TiVo's modem, for example. Nifty voltage indicators and audible alarms let you know the status of your power. Users report a significant decrease in system noise using this device. Unfortunately, the extra-long power cord is not detachable.

Power conditioners. Power conditioners are component-sized power distribution systems with multiple outlets. The simplest and least expensive of these provide more advanced passive power filtration than is available from a power bar using circuitry containing capacitors and other components together with surge and spike protection. The capacitors in these units can store energy for quick availability during power-hungry musical transients, such as loud rim shots. These may also have displays that serve as line voltage monitors. The Monster Cable PRO 2500 rack-mountable unit is an example ($200).

Balanced power. The next rung up the power conditioning ladder are conditioners that reformat a wall socket's AC power into so-called balanced power. In addition to filtration circuitry, these units contain a **transformer**, which makes them expensive and quite heavy. Transformers are made of two coils of wire in close proximity to one another so that the electric field of the first coil (the "primary") induces current in the second coil (the "secondary") through the air.

The ExactPower EP15 is a high-end active power regenerator.

Wall power is unbalanced or single-ended in the sense that one pin of the wall socket (in North America, this is the larger one on the left) is "hot" and swings from +120V to -120V over one cycle of AC. The other pin (the right) is a ground return at 0V. When these are connected to the transformer's primary coil, the voltage swings on the secondary coil are distributed equally between the two wires. That is, one wire swings to +60V while the other is at -60V for a total voltage difference of 120V.

Numerous companies make balanced power conditioners. The Blue Circle Music Ring MR800 is one example ($700; www.bluecircle.com) with two amplifier outlets, two analog outlets, and two outlets optimized for digital equipment, as well as surge protection and a detachable power cord. The MR800's 800W of power will be sufficient for many systems, but for those who need more, there is the MR1200. The MR1800 and the MR2400 will provide more power still but require special oven-type connectors and a 20A feed.

Monster Cable's Home Theater Reference PowerSource HTPS 7000 ($1,300) is known for its sonic benefits and has 12 outlets optimized for computers, amplifiers, and analog and digital equipment, as well as phone jack protection, a 12V input for remote on/off switching of switchable outlets from your receiver (you can program the outlets to be always on, switchable, or switchable with a delay). This unit also has an elaborate system of indicators and programmable alarms for abnormal line voltage, reversed polarity, improper grounding, surge protection, and more. Alas, the power cord is not detachable.

Active power regenerators. A final class of power conditioners is the active power regenerator. These are essentially unity gain, which means the wall power is treated as a signal that is passed through an amplifier without increasing the voltage (voltage increases are also called gain). Active power conditioners have highly efficient digital switching power supplies that regenerate a waveform that is voltage- and shape-corrected using a microprocessor.

An example of a device of this type is the ExactPower EP15A ($1,995; www.exactpower.com), which has eight outlets that are always on and can provide the full power available from your 15A household circuit (about 1,300W). The microprocessor continuously monitors the power output under load and is able to correct voltage to within 1% of 120V virtually instantaneously with surge protection. This unit has a detachable power cord, though one might question the utility of an expensive after-market cord here. After-market cords running from the device to your components are another matter.

Summing Up

Power is a weak link in many home theater systems that must be optimized to let your equipment reach its full potential. The improvements in sound and video quality can be quite astonishing. A no-holds-barred approach to power conditioning would include a dedicated circuit from your home's breaker box, a high-quality wall outlet, and a power conditioning unit with audiophile-grade after-market power cords feeding each of your HT components. While not everyone is prepared to go this far, we recommend using a little contact cleaner and experimenting with better-than-stock power cords. Let your eyes and ears be your guide and see where they take you. CE

BY ROSS MANTLE

Sights & Sounds

TiVo, Your Way

Commentary by Brian Hodge

We regard certain things as immutable laws of nature: The sun rises in the east. Adam Sandler will never win an Academy Award. In the used gear market, prices for older versions of a product are cheaper than for their more recent successors.

Except now and then, nature tosses in an exception to the rule. So far, there's no evidence that those first two laws are in danger of crumbling. As for the third, consider the prices for second-hand TiVo Series 1 players. Quite often, you'll find that they sell for more than used Series 2 models . . . at least on an open market such as eBay, where anybody can come along and bid for them.

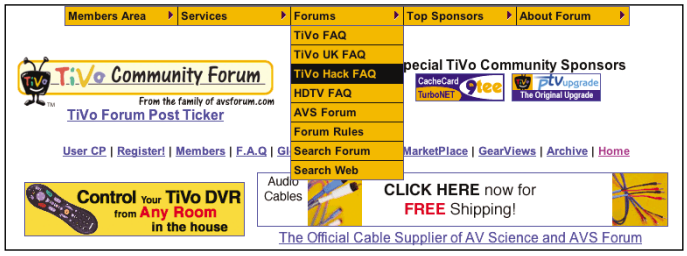
If Series 2 equals newer and better, what is it about the first generation models that makes them so attractive? Simple: They're easier to hack.

User Ingenuity

TiVo is the combination of hardware and subscription service that lets you record TV to a hard drive, like a digital VCR but with such added advantages as the ability to pause playback and rewind for a second look at something even as a program is airing.

If tech-savvy users can improve on an item out of the box, you can bet they'll give it their most creative try. TiVo machines became a prime candidate for modifications for two reasons: They use standard IDE hard drives, and their programming code is written in the open-source Linux OS. For hackers, that's like ringing a dinner bell.

Lest you think this is some back-alley activity conducted by shadowy cabals, it's not. It's legal, out in the open, and the vast majority of hackers are careful not to overstep ethical boundaries. For the most part, TiVo, Inc., tolerates, if not endorses, hacking, and even some TiVo employees take part (in an unofficial capacity) in the online forums and discussion groups the activity has spawned.



TiVo Community's Underground Playground area is one hacking resource that doesn't require you to check your ethics at the door.

3 Main Types Of TiVo Hacks

Recording capacity. Just as you can increase your computer's storage space, you can extend a unit's recording time (currently a maximum of 140 hours, out of the box) by adding a second hard drive or replacing the original drive with a larger one.

Networking. If you've linked your home PCs into their own local network, it's possible to add TiVo to that network. This lets you control TiVo from a PC, optimize it with utilities, and view network applications on your TV, such as scrolling news headlines and stock prices. Other clever tweaks include room-to-room instant messaging and displaying caller-ID information.

Video extraction. This involves creating a signal path for sending TiVo recordings to a computer where you can archive them to recordable media. (The path is two-way, also letting you route material from your computer to TiVo.) And here's where TiVo officials start to frown, citing copyright concerns, although this seems a specious objection. People have been archiving programming since the arrival of the VCR. More likely the official objection stems from the fact that Pioneer markets a TiVo-equipped recorder that also burns DVDs, and TiVo's additional Home Media subscription option lets you access music and photos on your computer.

Hack It Yourself

For most people, the word "hacking" conjures up impressions of arcane knowledge and dark arts. "User-modification" sounds like something you might actually pull off. And, it's true: If you can wield a screwdriver and follow instructions, you just may be able to accomplish some TiVo user mods of your own. (Be aware, however, that in many instances you will be voiding your warranty, if it's still in effect, so that might influence how soon you want to tackle the project.)

Online megastores Amazon.com (www.amazon.com) and Barnes&Noble.com (www.bn.com) carry at least three how-to books: "TiVo Hacks" by Raffi Krikorian, "Hacking the TiVo" by William Von Hagen, and "Hacking TiVo" by Jeff Keegan. Be sure to read the customer reviews to see how each one correlates with your player and intentions.

If you prefer more interactive tutelage, drop by the thriving TiVo Community forums (www.tivocommunity.com). Because the machines will likely only get more challenging to modify, this up-to-the-minute resource will keep you abreast of what's possible and what's better left alone.

Either way, TiVo's promise of "TV your way," can be closer than ever to total fulfillment. CE

BY BRIAN HODGE

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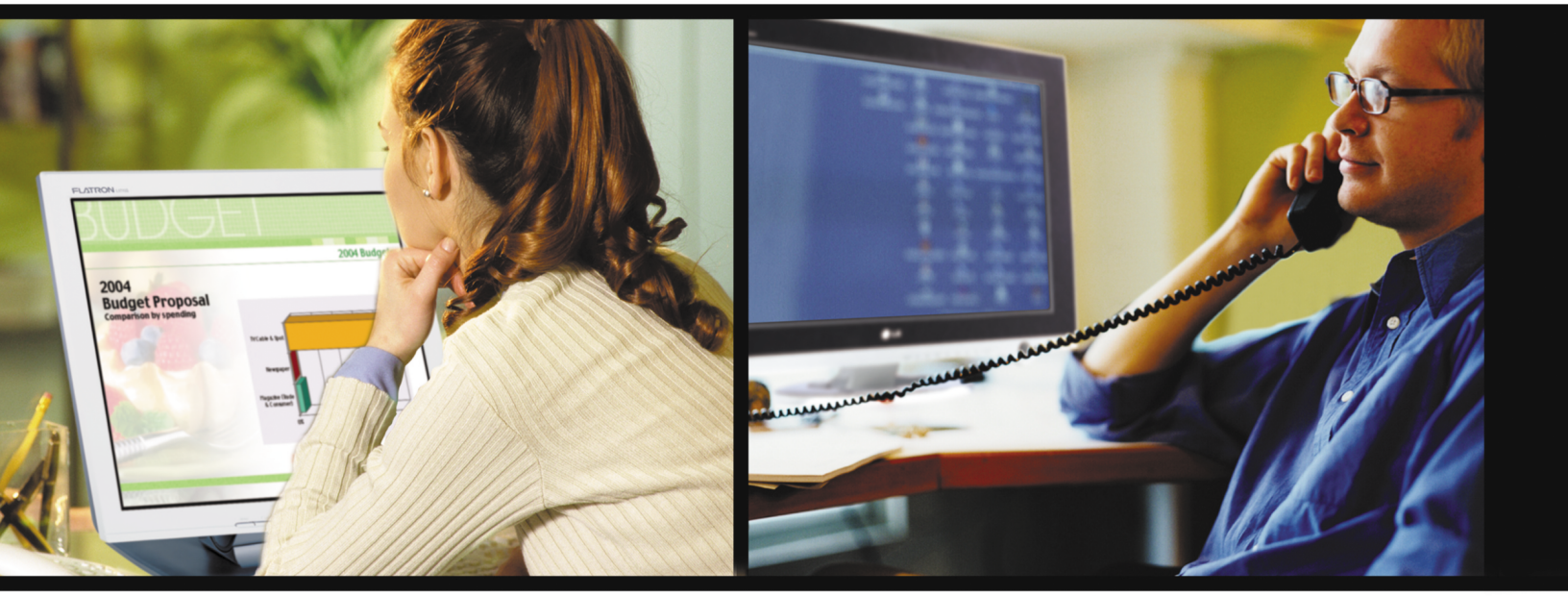

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Troubleshooting Tips For Better Visuals

Thrives On The PC Connection

Listen To Music, Watch TV, Edit Pictures, Store Data & So Much More

Like streams snaking off rivers, technologies continue to branch off of PCs, filling our lives with brilliant sounds, pictures, videos, and more. But unlike distributaries flowing only away from the source, technologies that emanate from PCs often continue to work in tandem with the computers to create a vibrant, powerful environment that delivers some of the best in media and entertainment.

PCs and their CE-related peripherals are more popular than ever. The penetration of PCs in U.S. households is now almost 80%, and the Gartner Group predicts global PC sales will still rise 13.9% this year, up from an increase of 11% last year. Peripherals such as digital cameras are enjoying similar popularity, as IDC predicts sales of roughly 69 million digital cameras this year, a whopping 40% increase over 2003. The future looks bright both in the retail sector and on the home front where the possibilities of integration between PCs and consumer electronics are nearly endless.

Consider digital imaging. Last year, digital cameras outsold their film brethren for the first time, and now we're at the point where most avid photographers own at least one digital camera. As a digital camera owner, you could technically survive without a PC, but the PC offers a whole new world in terms of editing, manipulating, sharing, and storing photographs. In fact, much of the digital camera's allure resides with the PC, which grants us loads of power over our photographic creations. The same allure exists with digital video, where flexible, sexy digital camcorders give us the ability to make mini-masterpieces of our video using our PCs, and it's tough to ignore their consistently falling prices.

Our entertainment centers can also benefit from a healthy dose of PC/CE integration. For starters, DVD burners are a must in any serious entertainment configuration, and they're cheaper, faster, and more reliable than ever. Although you can buy a big, bulky standalone unit to squeeze into your entertainment console, you'll require less space and find more power and flexibility with a burner that's connected directly to your PC, whether internally or externally. Unless you're only interested in transferring tape-based video to DVD, a PC-based burner is typically the better option, as you'll have the capability to edit your DVDs as though they came directly from a professional production facility.

For television buffs, PCs afford a cheap, flexible opportunity for digital video recording that rivals typical TiVo-like fare. Transferring a TiVo recording to a PC is a difficult endeavor, but if you capture the content directly to your PC, you can record and watch the content easily on your PC. There's plenty of free DVR software available, and if you add a video capture card and enough storage to the mix, you have yourself a worthy DVR station. Speaking of storage, if you work with any type of digital content, whether it's pictures, video, or sound, you'll need a place to store it for short-term use or archival purposes, and PCs provide the perfect receptacle. Hard drive prices are so low today that you could easily fill your PC with enough storage to handle all of your digital needs for years to come.

You can also use wireless digital media hubs to stream music throughout your house directly from your PCs. It's not much fun listening to a massive collection of MP3s only in the room where you keep your PC, but by using a wireless hub, you can beam the music through your house to any properly equipped stereo receiver. If you're sick of your MP3 collection, no problem. Tune in to any one of hundreds of online streaming music stations. You can even use software that creates playlists based on the mood of the music in your collection. Some media hubs don't stop at music, either, because if you have a TV nearby, they can even let you view pictures stored on your PC.

We owe plenty to the venerable PC for helping to launch the CE revolution, but lucky for us, it's still very much a part of the picture. In fact, as PCs and CE continue to grow alongside each other, we'll continue to see integration that spawns both power and possibility. CE

BY CHRISTIAN PERRY

Pretty As A Picture

A Digital-Imaging Primer

Easily creating, editing, and sharing digital images and video are some of the key benefits of owning a PC, and there are many products designed to take advantage of these capabilities. Digicams eschew film in favor of memory cards, while digital camcorders make it easy to transfer video to a PC without losing quality. Scanners continue to improve, and accessories such as memory card readers let users get more out of their hardware and use multiple products on the same PC with few compatibility problems. This hardware is easy once you master the basics, and we'll help you properly set up your equipment so you get the most out of it.

Digicam: Setup & Use

Before taking pictures, learn how to adjust the camera's resolution and compression levels. **Resolution** measures the number of horizontal **pixels** (picture elements) x vertical pixels, so an image with a resolution of 1,600 x 1,200 has more than 1.92 million pixels.

More pixels generally translates into better quality, so when you're taking pictures that you plan to print, use the highest possible resolution setting your digital camera supports. When taking pictures you plan to print on a photo printer, 1,600 x 1,200 resolution creates acceptable prints that are 5 x 7 inches or smaller. For clear 8- x 10-inch prints, the minimum resolution should be approximately 2,048 x 1,536. Higher resolutions than these minimums allow for cropping and zooming while retaining acceptable print quality.

Most digital cameras use compression algorithms to reduce file sizes while having a minimal affect on image quality. The Coarse setting (or its equivalent on your digital camera) yields pictures with the smallest file sizes but the worst image quality. Fine increases quality at the expense of larger file sizes, and Superfine generally makes for very large file sizes but vastly improved image quality compared to Coarse. Some high-end digital cameras take pictures in **raw** mode (or an equivalent mode), which does not apply any compression at all. This setting is unbeatable in terms of image quality, but file sizes become absurdly large.

To put this in perspective, many digicams come with 16MB memory cards. If you take all shots at a 1,600 x 1,200 resolution, you can store more than 60 images in 16MB if aggressive compression is applied, more than 30 with midlevel compression, or more than 15 with the lightest level of compression, but only two images in raw mode.

It is best to buy the highest-capacity memory card you can afford and take all of your pictures using the camera's highest resolution and lowest level of compression. That way, you'll always be able to print high quality pictures if you want to, but you'll have the freedom to use an image editor to crop or resize a picture for use on a Web site or to email to friends and family.

If your camera has a digital zoom, turn it off and rely on the optical zoom instead. **Optical zoom** relies on the camera's optics for zooming in on subjects, so image quality remains high. **Digital zoom** simply blows up individual pixels to make the subject appear closer, creating horrible image artifacts such as blocks of color and jagged lines.

Digital cameras have color LCDs that make it possible to frame shots without

looking through a viewfinder, and most cameras display image reviews immediately after you snap a shot. Adjust the image or picture review timer to its lowest possible setting so that the review picture doesn't interfere with framing the next shot. LCDs also eat up a lot of battery power, so if you want to squeeze a little more life out of your batteries, turn off the LCD and rely on the optical viewfinder.

Troubleshoot Digital Cameras

Many digital cameras produce pictures with slightly boosted color levels. Use an image-editing program to reduce the picture's Saturation level by 10% to 20% for a quick fix. If your software also has an Auto Levels feature, use it before you print the image to see if it can improve colors and contrast.

If the autofocus has a tough time locking on when you're shooting close-ups, switch to the camera's Macro mode if one is available. Otherwise, set the camera to its highest resolution and lowest compression level, step back, take the shot, and crop it down to size later using an image editor.

If your camera runs for only a few hours on a set of alkaline batteries, consider rechargeable replacements. Rechargeable AA and AAA batteries tend to drain more slowly than alkaline batteries when you use them in digital devices, and the most powerful rechargeable batteries sold today have power ratings of 2300mAH (milliamp hours) or longer, meaning they generally last several times as long as their alkaline counterparts.

Digital Camcorders: Setup & Use

When you connect a digital camcorder to a PC, try to use a pure digital connection (USB 1.x, USB 2.0, or FireWire, depending on what your camera supports). It's possible to send an analog feed from a digital camera using composite RCA cables or and an S-Video cable connected to video card inputs, but you lose quality because the original digital information is converted to analog output and then converted back into digital format for storage and editing on a PC. Anytime you convert video, it loses quality, and that is true for digital-to-digital conversions, as well. So do what you can to edit video before doing any type of conversion to preserve the maximum quality.

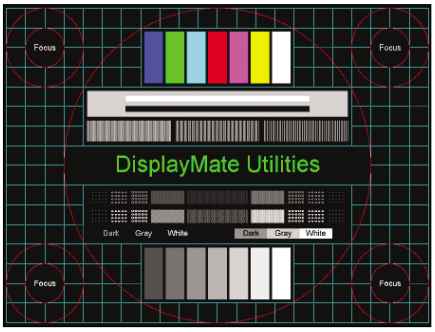
As for setup, much of what applies to digital cameras also applies to digital camcorders. Turn off digital zoom and only use optical zoom to preserve video quality. Most digital camcorders have high optical zoom levels compared to digital cameras, and you need to remember that every level of zoom magnifies camera motion just as much as it magnifies your subject. If your camcorder has optical image stabilization, use it. If it has digital image stabilization, turn it off because it can make recordings slightly blurry. Instead, use a tripod if you want to zoom in; otherwise physically move the camera closer to your subject for close-ups and don't use zoom at all.

The original image (top) was taken using the camera's maximum optical zoom, while the blown-up image on the bottom was taken using the digital zoom, which obviously doesn't retain any detail.

LCDs are great for framing video without having to keep the camcorder pressed to your eye, but stowing the LCD and relying on the viewfinder is a great way to conserve battery power during longer recording sessions. Another way to conserve battery power is to save editing for the computer. Many cameras have in-camera editing tools that let you access basic special effects and transitions for on-the-fly editing, but because the LCD must be on to get any use out of the tools, it's best to edit when the camera is plugged in.

If you have Windows XP, one of the easiest and cheapest ways to edit video is to download Microsoft's Windows Movie Maker 2 (free; www.microsoft.com/windowsxp/moviemaker/downloads/moviemaker2.asp).

This improved version of Movie Maker contains all the tools you'll need to create professional-quality video with minimal training in a short amount of time. No matter what kind of editing you do, save the fancy special effects and transitions for special occasions. Rely mainly on simple cuts or fades to transition between scenes, and your audience will thank you. To see previews of what different transitions look like, open Movie Maker 2 by



DisplayMate is relatively expensive, but its test patterns help fine-tune a monitor for extremely accurate editing and printing.

clicking Start, expanding All Programs, expanding Accessories, expanding Entertainment, and clicking Windows Movie Maker. Expand the Locations drop-down menu, click Transitions, and double-click any of the transition icons to see a preview clip.

Troubleshoot Digital Camcorders

When traveling outside the United States, be aware that output from your camcorder may be incompatible with TVs in other countries. The United States, Canada, and Japan all use the NTSC (National Television System Committee) standard, while most other countries use incompatible PAL (Phase Alternating Line) or SECAM (Système Électronique pour Couleur avec Mémoire) formats.

If video shot in low light looks choppy, consider buying an external light for the camera and turning off its low-light-shooting features. Low-light-shooting features generally let more light into the camcorder by exposing each frame of video for longer than usual, which causes the choppiness. If you record using a low-light mode, keep the camera as still as possible and tell your subjects to move as little as possible. If video shot in the dark looks green, that's normal—your camera is using infrared light to "see" and it's not possible to get full-color video.

Integrated microphones also are generally weak and tend to pick up noise generated by the camcorder's moving internal components. An external or wireless microphone can dramatically improve audio recording, and directional microphones practically eliminate sound from the sides and back of the camera, recording sounds only in front of the camera, which is perfect for recording plays and concerts.

Scanners: Setup & Use

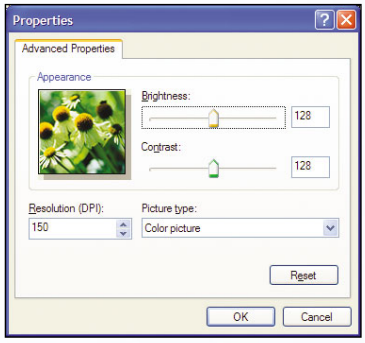
If possible, get a scanner that uses a USB or FireWire interface instead of one that uses a parallel port, serial port, or SCSI (Small Computer System Interface) interface. These last three types of interfaces are extremely slow compared to USB and FireWire and are found primarily in older scanners (so it's something to be aware of when buying second-hand equipment).

Most scanners come with CDs containing drivers and utility software. In most cases it's important to install the scanner drivers before connecting the scanner to a USB or FireWire interface, but do it in the order recommended by the manufacturer. WinXP users can connect any plug-and-play scanner to their computers and use the OS' integrated Scanner And Camera Wizard to access most features and settings. Click Start and My Computer and then double-click the scanner's icon to access the Wizard.

When using the Wizard or the software that came with your scanner, it generally is easiest to select the type of image you want to scan (Color, Black And White, etc.) using the provided radio buttons and let the scanner do the work for you.

Previewing a scan adds a few seconds to the scanning process, but it saves so much time in the long run that we recommend you always preview scans. Just click the Preview button and wait for the image to appear in the preview window. Drag the corners of the box in the Preview window so they surround the portion of the image you want to scan, and the scanner scans that portion and sends it to the computer where you can edit the image if necessary.

To modify scans further, click Custom Settings in the Scanner And Camera Wizard or the equivalent button in your scanner's software. This opens basic Brightness, Contrast, and Resolution settings. If scanned images are dim, increase the brightness slightly to compensate. If colors are dull or the black looks grey, boost the Contrast setting.



When establishing a scan's dpi setting, you should rarely use the scanner's maximum optical resolution.

The Resolution setting is important because it determines how large the final image is and also how much detail the image has. With scanners resolution is expressed in dpi (dots per inch), and the optimal dpi setting varies depending on the type of material being scanned. When you're scanning magazine pages for printing, it's best to use a setting of 200dpi. When you're scanning photographs, experiment with settings between 100dpi and 200dpi. Double the dpi setting to double the size of the printout, but be aware that every time you double the dpi, the resulting file size quadruples. When you scan material that you'll display only on a computer monitor and you don't intend to print the images, a 100dpi setting or lower will generally suffice.

Troubleshoot Your Scanner

If scans look awful when you select a high dpi setting, the setting may exceed the scanner's optical resolution. The scanner has had to use interpolation to enlarge the image artificially by using algorithms that insert rows of pixels into the image. For best scan quality, never exceed the scanner's optical resolution. The optical resolution's listed in the specifications section of the instruction manual.

Printers have dpi settings, as well, but they aren't equivalent to scanner dpi settings. With printers, the dpi value literally translates to the number of dots the printer can create per inch of printed material. More dots equates to higher resolutions and better printer quality, and today's photo printers can output thousands of dots per inch.

Because of these differences, if your printer supports 600dpi output, don't scan materials at 600dpi thinking you'll get a 1:1 match between input and output. Scanning at 150dpi to 200dpi is sufficient for outputting 600dpi photos from

a printer. Experiment with higher scanner dpi values when using a photo printer to see what looks best with your hardware combination. Generally, scanning at 250dpi to 400dpi is sufficient for quality high-resolution photo printer output.

Photo Printers: Setup & Use

Installing a printer is usually easy; you need to install the drivers and then turn on the printer so that Windows recognizes the device. Once installed, however, you must establish a multitude of settings.

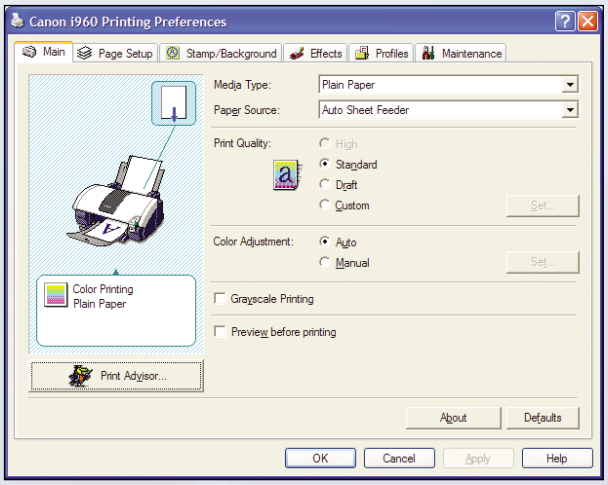
To access the print preferences open a program with a Print feature, expand the File menu, click Print, and click Properties. The tabs and entries that appear vary depending on the features supported by your printer (and the driver that is installed), but there are several important settings shared by most photo printers.

Print Quality is an important setting. The highest settings (usually labeled High or Fine) produce prints with the best quality, but they use the most ink. The Standard setting reduces quality to conserve ink, and the Draft setting outputs prints with horrible quality that use very little ink. We use Draft when we're experimenting with layouts or cropping, and we stick to the highest quality settings when printing pictures we want to keep or share.

Many times you can't select the highest quality settings if you've selected plain paper in the Media Type or Paper Type menus. Always use these drop-down fields to select the type of paper you've loaded in the printer for the best printout quality. Most printers work best with paper from the printer's manufacturer, but that isn't always the case. Try to get your hands on some sample packets from several manufacturers and print the same image on each of them to find one that complements your hardware.

When you're printing photos that you took with the camera tilted on its side, change the Orientation setting to Landscape to make the picture fit better on the paper. If your printer has a borderless printing setting, use it only when you're printing to photo paper.

For the best possible printouts, always use ink from the printer manufacturer. Generic ink may seem like a bargain, but compared to factory ink, it doesn't reproduce colors as accurately and is more apt to clog print nozzles.



Sometimes a printer's highest possible quality setting is not available when you load plain paper instead of photo paper.

Troubleshoot Photo Printers

Most photo printers rely on thousands of nozzles to evenly distribute ink, and if you haven't used your printer for more than a week, the ink in the nozzles can dry out and clog the print head. If printouts have streaks of color or patches without ink, clean the print heads according to the printer's documentation. If all else fails, load several clean sheets of paper and print images. This should pass enough ink through the system to unclog the jams. This procedure, as well as any cleaning cycle built into the printer, consumes a lot of ink, so keep fresh ink tanks on hand just in case.

If you've installed multiple printers on the same PC, you should be able to select the printer you want to use each time you invoke the Print command, but it's easier to set their default printer as the printer that outputs mostly text and another printer to output pictures. To do this in WinXP, click Start, Control Panel, and Printers And Faxes, right-click the icon for the appropriate printer, and click Set As Default Printer. In Windows 95/98 and Windows Me, click Start, expand Settings, click Printers, right-click the printer icon, and click Set As Default.

If paper jams in the printer and some is exposed near the input or output trays, don't grab the paper and yank it out of the printer. If you're forced to resort to this method, never pull the paper in the opposite direction relative to the direction it feeds into the printer. The gears and other hardware in the printer are not designed to move backward, and you can easily break something by pulling out paper against the feed. Use the printer's paper jam removal feature, if one is available, or refer to the instructions for opening the printer and manually clearing the jam.

A Digital Window

Although most people pay close attention to the hardware and software that creates, modifies, and outputs digital images, very few bother to properly adjust the one piece of equipment that lets them see what they are manipulating—their computer monitors. Calibrating a monitor isn't easy nor fun, but it's essential if you want what you see on-screen to match what your printer outputs or what friends will see when you send digital images.

You should calibrate with test patterns; check your monitor manufacturer's Web site to see if it has any free test-pattern software. If you're serious about calibration, DisplayMate ($69 and up; www.displaymate.com) is the most comprehensive calibration suite available to consumers, and it also includes printer calibration tools. The price may seem high, but considering how proper calibration affects every image you edit and print, tools such as DisplayMate are an invaluable investment. CE

BY TRACY BAKER

Cope With An Expanding Universe

Hard Drives & Optical Storage For Your PC

The ubiquitous PC carries a hefty burden as it tries to cope with its ever-changing role in our homes. As the world becomes more digital and less analog, we expect our PCs to be able to process, categorize, and store our digital lifestyles. Whether it's home videos, music collections, or digital photos, we expect our PCs to store this array of files and data without a hiccup. To make sure your computer can accommodate your digital lifestyle, we've assembled the info you'll need to equip your PC with the capacity to store your data. Today's PCs rely on two primary technologies for storing data. The hard drive stores data to a series of platters using microscopic magnetic particles, and the optical drive family (CD drives and DVD drives) uses a laser to write data to a removable disc. Each technology has unique benefits and drawbacks, so understanding *when* to use them is as important as *how* to use them.

Hard Drives

Magnetic hard drives have been around for decades, and they remain the storage device of choice on most PCs. From humble beginnings as an expensive, cutting-edge technology, hard drives have matured into reliable, easy-to-use storage systems that deliver the best bang for the buck. Current hard drives range from 1GB to 300GB behemoths.

Hard drives operate by storing your data on a series of rotating platters that are coated with magnetic particles. As the platters in the hard drive spin, drive "heads" mounted on a mechanical arm float back and forth above the surface, reading and writing data to the platter. These drive heads read and write data by measuring and changing the magnetic state of small sections on the platter.

Depending on the model of hard drive, these platters can spin as fast as 15,000rpm. With the drive's head and arm floating less than 1mm above the platter, providing your computer with a stable platform is important. If you jostle or bump the drive, the drive's head may hit the spinning platter. This is known as a **head crash** and usually results in the drive's failure. Today's hard drives are fairly rugged, but it's a good idea to treat a hard drive carefully.

Internal Drives. Adding an internal hard drive is an economical way to increase your PC's storage capacity. Most desktop PCs can easily accommodate a second hard drive, but you'll need to understand the different types of interfaces before choosing a drive.

Internal hard drives for home PCs typically use one of two interfaces or connectors. The predominant interface is **ATA** (Advance Technology Attachment), often referred to as IDE (Integrated Drive Electronics). ATA drives connect to your computer's motherboard via a 2-inch-wide ribbon cable. A separate power cable connects the drive to your PC's power supply. Most motherboards let you connect two ATA cables, each capable of chaining together two hard drives for a total of four per PC.

The newcomer to internal hard drives is **SATA** or Serial ATA. SATA is an entirely new approach to hard drive interfaces. Each drive connects to your motherboard via a small cable. SATA drives are often **hot-swappable** (meaning you can connect or disconnect them while your computer is running), but you can't chain them together. Not all motherboards support SATA drives, but in the next few years, SATA will supplant ATA as the prevalent drive interface. Even better, with a theoretical maximum throughput rate of 150MBps (megabytes per second), SATA drives are considerably faster than ATA drives.

External Drives. External hard drives are similar to the internal drives we discussed, with some exceptions. Because

the delicate hard drive mechanisms and circuitry are usually protected by your PC's case, external hard drives require an enclosure or shell to secure and protect the hard drive from dust, dirt, and other damaging material. Most hard drives aren't designed to be portable storage devices, even when you use them in external drive bays or enclosures.

External hard drives usually need a power adapter to supply electricity to the hard drive, and they often have cooling fans built into their enclosures. The fans generally do a good job of keeping the drive at an optimum temperature, but they can create a discernible noise.

Finally, external hard drives require an interface for transferring data back and forth from your PC. The two main connections are FireWire (also referred to as IEEE 1394) and USB (Universal Serial Bus). FireWire comes in two formats: FireWire 400 and FireWire 800. These formats transfer data at speeds of up to 400Mbps (megabits per second) and 800Mbps, respectively. USB also comes in two formats: USB 1.0 (capable of 12Mbps) and USB 2.0 (capable of 480Mbps).

Both FireWire and USB use small cables for transferring data to your PC. Despite the range of speeds, you should base your choice between FireWire and USB on the type of interfaces your computer has. Because external drives use the same hard drives as internal drives, the storage capacity for single drives is similar. However, many external drive enclosures use multiple hard drives to provide storage capacities up to 1TB (terabyte, or 1,000 gigabytes).

Internal vs. external. Deciding whether to use an internal hard drive or an external hard drive depends on two factors: How comfortable you are in opening your computer case and whether your case has room for an internal drive. If your computer lacks space for a second drive, you'll want to choose an external drive. External drives are more expensive than internal drives but are easier to install. Before shopping for a hard drive, learn what interfaces your PC supports, as well as any limitations on drive capacity and power consumption. Many low-priced PCs lack adequate electrical power for extra hard drives, so be sure to read the manual that came with your PC. You may also be able to find hardware specifications at the manufacturer's Web site.

Install A Hard Drive

Adding a hard drive to your system consists of two steps: installation and configuration. Before you follow any of the steps we outline below, be sure to properly shut down your computer and unplug it from the wall outlet.

Internal drives. You'll want a Phillips screwdriver and an electrostatic wristband (to protect your computer components against static electricity) before you begin installing your internal drive. You can buy electrostatic wristbands at most electronics stores.

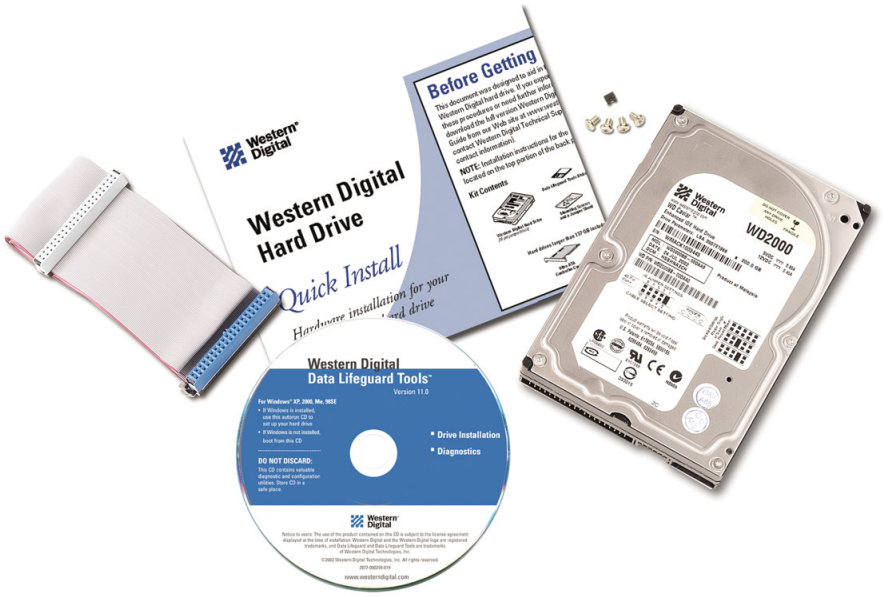
With your computer plugged in, open the case and touch part of the metal chassis. This will disperse any static electricity that may have built up. Now, unplug your power cord from the wall outlet.

Next, decide how you want to configure the new drive. Your options are: Master and Slave or Cable Select. In both master/slave and cable select, the second or slave drive is controlled by the first (master) drive. The main difference is in their placement on the ATA cable. If your first (original) drive is set as a master drive, you'll need to configure the second (new) drive as a slave drive.

If you don't want to designate the drives as master or slave, you can set the **jumper** (an on/off switch, once extensively used on circuit boards to alter hardware configurations, that is composed of wires and a small metal piece) to cable select.

If the first drive is configured for cable select, you'll need to configure the second drive as cable select, too. Most hard drives have a small schematic diagram on the drive to help you change the jumper that determines these settings. When you connect the second drive to your ATA cable, attach it to the gray connector and make sure your original drive is attached to the black connector.

Next, locate the available slot in your computer case. You may have to consult your PC manual to determine the appropriate location. Insert the drive into the mounting bracket and make sure the power and ATA cables reach. You may need to buy new cables if the



When you buy a hard drive, it typically comes with data cables and a manual so you can properly install the drive.

ones that came with your PC are too short or lack a secondary ATA interface.

Attach the ATA cable and then the power cable. Both power cable connectors (sometimes referred to as Molex connectors) and ATA connectors are **keyed**, meaning that there's only one proper way to attach them to your drive. Although power connectors may require a bit of force to insert into your hard drive, the ATA connector should slide in easily. If you're forcing it, odds are you have it oriented improperly. That's all it takes to install the hard drive.

If you're using the newer SATA interface, you don't need to worry about master/slave or cable select settings. SATA drives operate on their own individual cables, which can make them easier to install and troubleshoot. Follow the previously outlined steps to install the drive and ignore the section regarding jumpers. Once your new drive is installed, re-assemble your computer case and skip ahead to the "Configure Your New Hard Drive" section.

Install an external drive. If you've decided on an external hard drive, you'll find the installation process markedly easier than the process for installing internal hard drives.

USB and FireWire external drives are probably hot-swappable, and your computer should recognize them. Connect the appropriate data cable (USB or FireWire) to your external drive and to your computer's interface. Both USB and FireWire connectors are keyed for proper insertion. As with any type of physical connection on your computer, if you need to apply a significant amount of force to make the connection, you're probably doing something wrong.

Finally, you'll need to plug the external hard drive's power adapter into an outlet and then into the drive enclosure. If your enclosure has a power switch (not all do), you'll need to turn it on.

Configure Your New Hard Drive

With your new hard drive properly connected to your PC, your next step is formatting and partitioning the drive so that your computer can use it for storage. We used Windows XP for our test installation, but most drive manufacturers will also ship instructions for older versions of Windows.

Boot your computer into Windows, which should detect your new drive. Click Start, right-click My Computer, select Manage from the context menu, and then scroll down to Storage and double-click Disk Management.

When Disk Management starts, it'll detect that your new drive needs to be initialized and launch a wizard to walk you through. When the Initialize And Convert Disk Wizard launches, click Next. You'll be prompted to Select Disks To Initialize. Put a check in the box next to Disk 1 and click Next. The next screen asks you to Select Disks To Convert To Dynamic Disks. Ignore this and click Next without selecting a drive. The last screen provides a summary of your choices; click Finish to start the initialization process. When your drive is initialized, the Partition Wizard will automatically launch.

External drives (both hard drive and optical disc) have simple connections for data and power. This drive from LaCie features two FireWire inputs.

The Partition Wizard formats your drive and partitions it into smaller sections (called partitions). For a second drive, we recommend that you create a single partition and use the default NTFS (NT File System). For Windows 98/Me users, we recommend using FAT32 to maximize your usable space.

When the Partition Wizard launches, click Next to start partitioning and formatting. Select Primary partition and click Next. In the next screen, you'll see the hard drive's maximum space. Set the partition size to equal the maximum hard drive space and click Next. Now assign a drive letter and click Next. Click Next again to accept the default formatting parameters and then click Finish to complete the process. As soon as the drive has been initialized, partitioned, and formatted, it's ready to store data.

Troubleshoot Your Hard Drive

If Windows doesn't detect your new hard drive or if the drive stops working after a successful installation, a little detective work may help you resolve the problem. Most hard drive problems stem from two issues: bad connections or defective hardware.

First, for internal drives, check that you've correctly set the jumpers; make sure both drives are set to either Master and Slave or Cable Select. Next, make sure the ATA/SATA cable and the power cable are properly seated. Finally, make sure the ATA/SATA cable is seated properly on your computer's motherboard. If none of these steps resolve your problem, try swapping out your ATA/SATA cable with a different cable. If your problem still persists, you may have a defective hard drive.

For external drives, troubleshooting is much simpler. Check that your hard drive has power and is properly connected to your computer. External cables are often inadvertently disconnected. If you have multiple interfaces, try using a different one for your hard drive. If your drive still doesn't work, you can try to connect your external hard drive to a second computer. If the problem persists, you may have a defective hard drive.

Recordable/Rewriteable Optical Drives

Optical drives are almost vital to today's PCs. Whether you want to distribute your home movies on DVD, burn

favorite songs to CD, or simply back up important files, a recordable optical drive is invaluable. Although most computers ship with a CD-ROM drive, these are often read-only devices. The real value is in recordable optical drives.

There are two types of recordable optical drives: CD-based drives that store approximately 700MB and DVD drives that store up to 8.5GB. In these two broad categories, you'll find recordable and rewriteable drives. You can record once to recordable discs, and you can record and rewrite data to rewriteable discs many times.

Adding a second optical drive to your PC takes about as much time as installing a hard drive. If your computer doesn't have a drive bay available for another optical drive, you'll probably want to opt for an external drive.

Internal vs. external. Like the hard drives we discussed, optical drives come in both internal and external configurations. If your case has space for a second internal optical drive and you're comfortable working inside your computer case, we recommend an internal drive. If you don't have the space, or aren't comfortable working inside your computer case, an external drive would be your best choice. To determine if your computer has an empty bay for another optical drive, consult your PC's documentation.

Install an internal optical drive. As with installing a hard drive, turn off your PC before working in its case. Open the case, discharge static electricity by touching a metal part of the chassis, and then unplug the PC. Determine where to put the drive. If you have multiple drive bays available, choose one and remove the placeholder **bezel** (face plate). These usually pop in if you give them a firm push. Next, check to see how your other optical drive is configured. Internal optical drives use the same ATA interface as hard drives and the master/slave and cable select configuration process. Configure the second drive as a Slave (if your original is configured as Master) or as Cable Select (if your original is set to Cable Select). Connect the power cable from your computer's power supply and close the case.

Now you're ready to boot to Windows. Depending on the exact type and model of optical drive, you may have to provide Windows with **drivers**. Drivers are small programs that tell Windows how to communicate with hardware devices. These usually ship with the drive itself, but if not, you may have to download them from the drive manufacturer's Web site. WinXP is compatible with most new optical drives, but older versions of Windows may not be so compliant.

External optical drives. Adding an external optical drive is as simple as connecting its data cable to your PC and plugging in its power supply. The transfer rate for most optical drives is slow compared to a hard drive, so it won't matter if the optical drive is using a slower interface such as USB 1.0.

After you've installed your new optical drive and booted into Windows, the new drive will be visible in Windows Explorer. To launch Windows Explorer, right-click Start and select Explorer. If your optical drive is properly installed, it should appear in Windows Explorer with the same type of icon as your original optical drive but with a different label. If your optical drive came with recording software, install it now. Recording software usually comes on CD, and you can install it as you would any other software. If you find after trying to burn a few CDs that the software that shipped with your optical drive isn't powerful enough, you may want to invest in Nero ($79.99; www.nero.com) or Easy Media Creator 7 ($79.95; www.roxio.com).

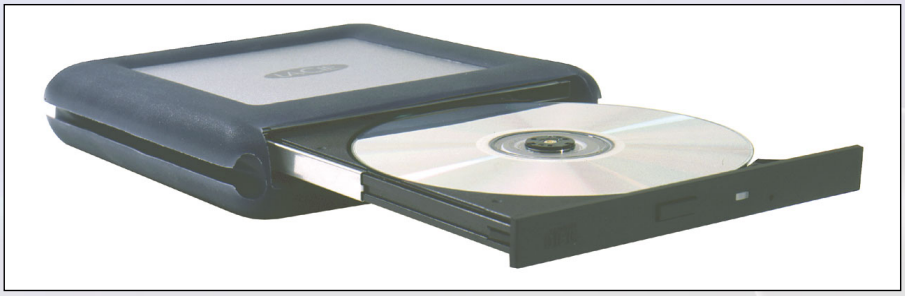
Troubleshoot Optical Drives

If Windows doesn't detect your drive, or it stops working after a successful installation, poke around and make sure all of the cables are connected and make sure you have the proper drivers.

If the drive won't read or record to a disc, the disc may have a problem. Try a different disc before troubleshooting.

If it's not a bad disc, check that the jumpers are correctly set. Both drives must be set to Master and Slave or Cable Select. Next, make sure the ATA/SATA cable and the power cable are properly seated. Finally, make sure the ATA/SATA cable is seated properly on your motherboard. If none of these steps help, swap out your ATA/SATA cable with a different cable. If your problem persists, you may have a defective optical drive.

For external drives, troubleshooting is simpler. Make sure your optical drive has power and is properly connected to your PC. If you have multiple interfaces, use a different one for your optical drive. If your drive still doesn't work, connect it to another PC. If the problem persists, you probably have a defective optical drive.



External optical drives, such as this PocketDVD from LaCie, are a quick and easy way to add a good deal of storage capacity to your PC.

A Place For Your Stuff

Although we can't say which storage device or medium will be around in the coming years, we're relatively sure that digitally archiving our lives will continue to consume space. Fortunately, adding extra storage to your PC is easy with today's hard drives and optical drives. CE

BY CHRIS JACKSON

Get Music To Your Ears

How To Set Up, Use & Troubleshoot Audio Components

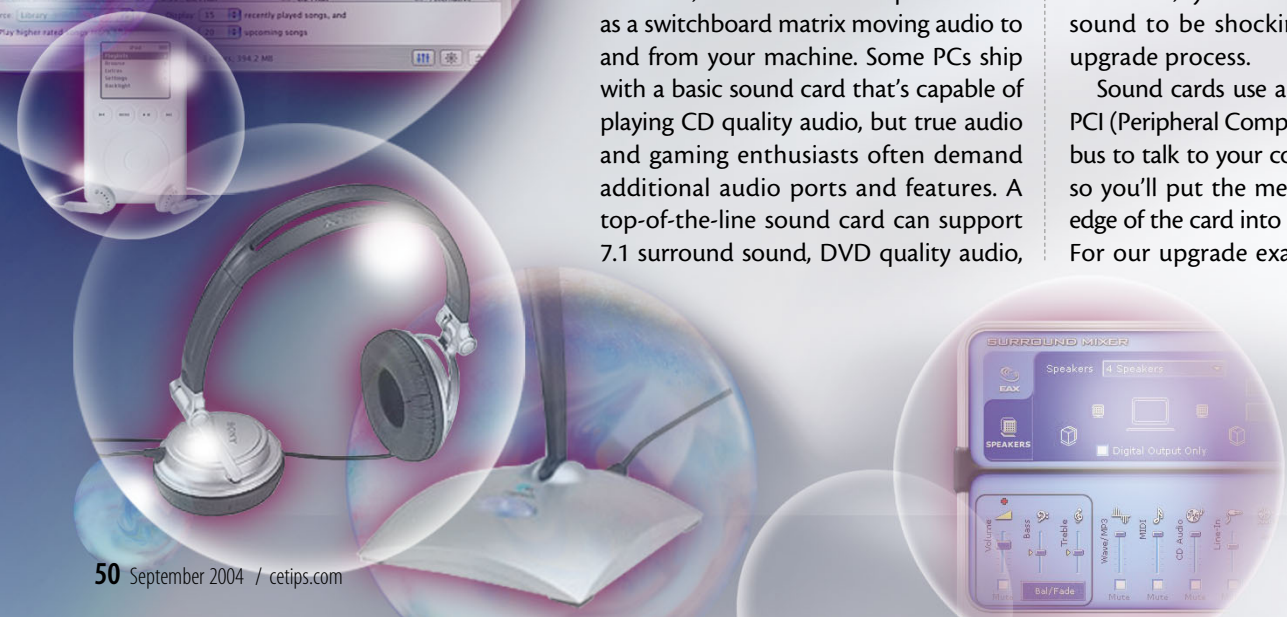
The simple bleep and bloop sound effects that accompanied the first computers didn't sound like much when you first heard them; they certainly didn't sound like music. Whenever early computers tried to build to a sonic crescendo that required the sparkling highs and thunderous lows of musical climax, we were always left feeling uninspired. But computers have evolved so they are now inextricably linked with music. Digital audio, DVD drives, and high-quality sound cards have reached a point where home computers can deliver better-sounding music than home stereos. With the capabilities of your computer rivaling those of recording studios, concert halls, and movie theaters, connecting and configuring the small army of devices can be a daunting task for any consumer. Here's some sound advice for managing your stable of audio peripherals.

Sound Cards: Enter The Matrix

The sound card is the center of the computer audio universe, responsible for making sure all of your speakers, microphones, and MP3 devices can talk to each other. Because the sound card's hidden away in the back of your PC, it's easy to forget what this mysterious card does or even that it's there at all. However, its function is simple: to serve as a switchboard matrix moving audio to and from your machine. Some PCs ship with a basic sound card that's capable of playing CD quality audio, but true audio and gaming enthusiasts often demand additional audio ports and features. A top-of-the-line sound card can support 7.1 surround sound, DVD quality audio, digital audio input and output, multichannel recording, telephone answering, joysticks, infrared remote controls, and auxiliary FireWire ports—essentially everything but hot and cold running water. Upgrading a sound card usually requires opening your computer, which can be intimidating, but after about an hour of effort, you'll be basking in the rich, warm sounds of high-definition surround sound.

Card tricks. Before opening your machine, you'll want to turn off the power to it and its fleet of attached gadgets. Make sure to touch a metal part of the case to discharge any static electricity you've built up by dancing on the carpet to your Shakira CD. Even if you don't notice the difference, the sensitive chips inside your computer will thank you. Now disconnect the power cable from the wall; you want the sound to be shocking, not the upgrade process.

Sound cards use a pathway called the PCI (Peripheral Component Interconnect) bus to talk to your computer's processor, so you'll put the metal contacts on the edge of the card into an available PCI slot. For our upgrade example, we used the

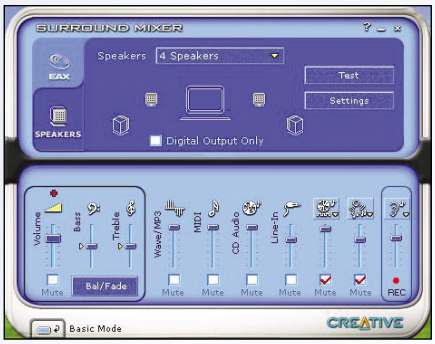


Creative Sound Blaster Audigy LS ($64; www.soundblaster.com). Like most cards on the market, it balks if it has to share the computer with a competing card, so it's always best to uninstall the old one using the Add/Remove Hardware wizard. Open your computer and find the old sound card. Remove the retaining screw and use a gentle but firm rocking motion to pull the card out. In some cases you'll also need to disable your computer's integrated sound chipset to prevent further conflicts, usually in the BIOS (Basic Input/Output System) setup screen accessible when you first boot up.

Take the new card from its static protective bag and insert it into the slot. You should feel a firm click as it seats. Now put the screw back into the metal bracket to be sure you can't accidentally unseat the card in your rush to plug in your dozens of devices.

The hard work is done. But before you close the case, check the manufacturer's instructions for other internal connections you may need to make; cards often interface directly with your CD drive. When you boot your computer for the first time after installation, Windows will detect the new sound card automatically and prompt you for a driver CD. You may also want to install additional demo songs or utilities from the CD to see what your new card can really do.

Get with the programs. The Audigy LS includes a suite of audio programs, such as sound editors and MP3 players, but you certainly aren't limited to those. Your new card will make all of your favorite audio programs and files sound even better. One program you will want to check out is the card's control panel application. Here you'll be able to select how many speakers you use so the card can generate appropriate surround-sound signals, an important feature if you want accurate audio location information. The Audigy also lets you select effects such as reverberation to make your room sound like a large, rich concert hall. Be careful not to overdo the audio magic; what sounds fun for two minutes can be tiring after two hours. But what ultimately matters is how much you like the sound; the same thing goes for EQ, or equalization. You'll be able to boost or cut the bass and treble to compensate for your speaker system and use presets for different kinds of music, such as rock or classical. Even if you're listening exclusively to Shakira, try lots of presets to see what sounds best. It could be the Classical



The Creative control panel does everything for your ears except remind you to wash behind them.

setting; what matters is that you're happy with the sound.

Dealt a tricky hand? If your machine doesn't automatically detect the new card, first make sure you've removed the old card (or disabled your system's integrated audio chipset) and its accompanying software. Use the Add Hardware wizard to get Windows to detect its new sound system. If the card still doesn't work, it might not be seated correctly in the PCI slot. Try powering down, removing it, and reinserting. Take special care to make sure the card is level and the metal contacts are lined up.

If your card is working, but you're not getting sound from one drive, you might have forgotten to secure an internal audio connection from that drive to the card. Open the case again and check it.

If the new card sounds strange, or if you're only getting sound from a few speakers, make sure you've plugged your speakers into the correct surround-sound ports and you've selected the correct configuration in the card control panel. You could be listening to just a small part of the sound.

If you're getting loud noise instead of music from your analog speakers, you might have accidentally plugged them into a digital audio port. Digital jacks often use the same RCA or miniplugs that analog jacks do. Check to make sure you're not accidentally sending digital data to your speakers instead of analog music.

Speakers: We're Surrounded

Long gone are the days when two speakers were enough to achieve the full sense of space in music and film. To experience the sonic landscapes of modern DVDs or hear an opposing player sneaking up behind you in a computer game, you need surround sound. By using four, five, six, or even seven speakers, surround sound simulates real-world omnidirectional sound. Surround-sound systems are named for the number of speakers and the subwoofer in the setup. For example, a 5.1 system has five speakers plus a subwoofer. With up to eight speakers in a 7.1 system to place and connect, setting up a surround-sound system can occupy a whole afternoon. Fortunately, we're here to help.

Down to the wires. Most surround speaker systems are powered, meaning the one component, usually the subwoofer, draws electricity from a wall outlet and uses it to amplify the sound sent out to each speaker. The first step is getting the audio from your computer to your speakers. We tried out the Altec Lansing 251 5.1 system ($99.95; www.altecmm.com); it uses a bundle of miniplug-type cables. However, some speakers use a digital format to get away with just one wire running from the computer to the subwoofer. The amplifier in the subwoofer then converts the digital code into music, saving you untangling trouble, although you'll still need speaker cable running from the subwoofer to each of the satellite speakers.

Once the subwoofer amplifies the audio, it travels to the satellite speakers over the cables. Placing the speakers can be tricky. Most quality systems will ship

with a combination of desk and wall mounting hardware to help you put the speakers where you want them. The most important consideration is symmetry. The last thing you want is for all the dialogue to come only from your left. Do your best to achieve separation between the speakers, while making sure they're pointed at and the same distance from your chair. If you have problems with weak bass, move your subwoofer into a corner. The walls will magnify low frequencies.

Although satellite speakers are magnetically shielded, meaning they won't interfere with your computer monitor or storage devices, subwoofers seldom are. Consequently, be sure to keep it away from any sensitive media; the 251's subwoofer should be at least 2 feet away from your computer to avoid distorted images on-screen and garbled sound.

Loud and proud. Once you've installed your new speakers, optimize your sound card for them. Make sure the sound card's Control Panel program knows how many speakers you have and where you've placed them. You should also experiment with the EQ settings to find the one that produces the best sound for your room. After doing that, sit back, turn up the tunes, and kick out the jams.

Crackling distortion is a common problem with speakers that aren't well matched to powerful sound cards. Turn down your sound card volume setting, normally found in the software control panel. Then turn up the volume control on the speakers to compensate. The result is clean, clear, and loud.

You can fix most problems with bass by moving the subwoofer. Position it closer to walls and corners for more bass. Still, subwoofers often contain their own volume and crossover frequency control, which determines at what frequency the subwoofer should stop producing midrange. You can make the sound muddy by lowering the volume, or warmer and richer by raising it.

Occasionally speakers just don't sound right. Sometimes it's hard to tell where voices or instruments are coming from. At worst, it can sound like the music is in a washing machine. If you've hooked up your speakers improperly, the sound they produce may partially cancel itself out, a situation audio nerds refer to as **phase cancellation**. Usually only a problem in speakers that use bare-wire hookups, it's simple to fix. Each speaker will have a contact for two wire ends colored red and black. As long as you connect like colors together throughout your system, you'll keep your speakers sounding great.

The Sony MDR-V300 headphones can make your teeth rattle without making your windows rattle.

Headphones: Get Personal

As those of us with neighbors know, you can't crank your eight-speaker surround-sound system to ear-splitting levels at all hours of the day. As much as you appreciate feeling the vibrations of the helicopters in "Apocalypse Now" when you're watching it on DVD, the rest of your apartment building may not. Fortunately, headphones let you feel the sound without disturbing your sleeping neighbors. Although you can listen to multimedia content on regular over-the-ear headphones or earbuds, a good set of cans will retain much of the sense of space that speakers give.

Setting up headphones is normally just a matter of finding the right port. Check to see if your sound card has 1/8-inch miniplugs or full-sized 1/4-inch phone plugs; the Sony MDR-V300's ($49.99; www.sonystyle.com) we tested came with a convenient snap-on adapter. Use the software volume controls so you don't have to listen at ear-bleeding levels if you don't want to. Some headphones also have a convenient volume control integrated into the cord.

Head in the right direction. Because headphones are next to your ears, they don't impart the same sense of space that a surround-sound system does. However, some sound cards, including the Audigy LS we tested, simulate it. Also, don't put your phones on backwards. Although the difference between left and right doesn't matter much when you're listening to music, you may get a little confused when you're playing games or watching movies.

Headphones are fairly trouble-free devices. Just don't forget to turn off your speakers when you turn up your headphones or your neighbors might cause some technical difficulties of their own.

Microphones: Now Hear This

We eventually got tired of our PC talking and singing to us when we realized that we had no way of talking back. A microphone lets you get more from your computer's audio system, opening up the possibilities for videoconferencing, Internet telephony, speech recognition, and even karaoke.

There are two types of PC microphones. The first connects to the sound card with a standard miniplug. If you have a nice sound card with a miniplug microphone input jack, this is the way to go. However, if your card doesn't have one, or the quality doesn't measure up, consider a USB microphone. They're simple to install and ideal for notebooks; because the digital conversion happens at the microphone, they sound great. Both types of microphones are available in tabletop and headset varieties. We tried the Logitech USB Desktop Microphone ($29.99; www.logitech.com) and appreciated its plug-and-play simplicity.

Regardless of what you choose, microphones may be unidirectional or omnidirectional. For most situations, we prefer unidirectional microphones. They pick up less noise and are less prone to the feedback and echoing that can happen when used with speakers. Keep the microphone as far away from speakers as possible and point the microphone away from the speakers. Many microphones

now have noise cancellation to remove unwanted background hiss; the Logitech microphone we tested even has an indicator light to signal when it's active. Experiment with it so you'll remove the noise but not your voice.

Check, one, two. Distortion is a common problem with microphones. If you get the cracking lo-fi sound from your mic, try turning down the microphone volume in your software control panel to prevent your sound card's inputs from overloading. If that doesn't help, move farther away from the microphone. Speak loudly and clearly, and try to minimize pops from Ps and Bs.

If you're getting squealing feedback or a trail of echoes from your voice during your videoconferencing, turn down your speakers or switch to headphones and turn the speakers off. **Feedback** occurs when a microphone's sound is amplified by speakers and then recaptured by the microphone to be amplified again and again. It's a vicious cycle that continues until the speakers can't squeal any louder. Echoes in videoconferencing are caused by the same process; the microphones pick up audio from the speakers, forming a loop. The solution in both cases is to reduce the transmission from speakers to microphones: move them away, turn them down, or turn them off.

MP3 Players: For Here Or To Go

No part of the digital music revolution has been as dramatic as the rise of MP3, the digital audio coding scheme that compresses about one minute of music into 1MB. Portable MP3 players let you create and download songs on your PC and transfer them to a handheld appliance to listen to on the go. Portable devices using flash memory storage, such as the Nomad MuVo 128MB ($89.99; www.creative.com), store dozens of songs; those using hard drives, such as the Philips HDD120 20GB ($329.99, www.consumer.philips.com), store thousands. Here's how to get your player up and running.

Rollover, DJ. Before buying a player, figure out how it's going to connect to your PC. Most use either USB 2.0 (Hi-Speed) or FireWire connections so they can quickly transfer your music. If you have an older PC, make sure you have the right kind of port so your MP3s won't be stranded; even if you can download and listen to MP3s on your PC, if you don't have the correct port, you won't be able to load the songs onto the player. Usually, once you've decided on a port, you connect the device to the PC and pop the included CD into your computer's drive. We tried the Apple iPod 20GB ($399; www.apple.com/ipod), which sits in a dock that attaches to a PC via FireWire or USB 2.0 (with an optional cable).

MP3 players include software so you can create, play, organize, and transfer your MP3s to your player. Our iPod came with Apple's iTunes 4.6, a proprietary program with all the usual MP3 creation and transfer features. If you already have a program, such as Musicmatch Jukebox Plus 8.2 ($19.99, www.musicmatch.com),

iTunes lets you import MP3s, buy them online, burn them to CD, and transfer them to your iPod.

it will almost certainly work with your player. Install the manufacturer's drivers. Using iTunes, we put a CD in the PC's player and clicked the Import button at the top right of the screen to save the songs to our Library. From there you can drag individual songs to the iPod to transfer them or create sequences of tracks called Playlists. You can create several Playlists, perhaps one for jogging, one for driving, and one for at home, and transfer them to your player as a group, allowing you to be your own DJ. If you want to transfer thousands of songs at a time, the software also has a Synchronize feature that will detect new songs in your Library and move them automatically.

Don't drop the beats. MP3 players are hardy devices, but remember to keep them safe and dry. Few electronic devices can withstand an accidental dunk in a mud puddle, and MP3 players are no exception. Consider getting a protective case for your device and wear it where you'll sweat the least; your player will last longer.

If your PC and MP3 player seem to go haywire every time you synchronize them, you may need to turn off the Automatic Synchronize feature at first. Your computer is likely trying to send your entire music collection to your MP3 player right as you plug it in.

And if your music library is truly gargantuan and won't fit on the player, you may be frustrated by the fact that the Synchronize feature can't decide which songs it should prioritize. To fix this, make a special folder or Playlist for all the songs that you want; when you synchronize your music from this subset, you get only the best songs.

Most software uses the online CDDB database to detect album and track names automatically when making MP3 files from a CD. Make sure your computer is connected to the Internet when you import songs, so you don't have to manually name all of your music files.

Fade Out

After your MP3 player is set up, you'll be fully equipped to enjoy digital audio both at home and on the go. Your soundcard will integrate your speakers, headphones, and microphone to create a musical paradise around your computer, and your MP3 player lets you bring a little piece of audio heaven with you as you travel. Of course, connecting all of your audio peripherals and getting them working together can be a daunting challenge, but considering the fantastic sound it's a small investment with a big payoff. Remember, rock 'n' roll isn't dead, it's just temporarily stuck in your computer.

By Joe Bell

Looking Good

Troubleshooting Tips For Better Visuals

Not all that long ago, video was an afterthought in the world of computers. Monitors were monochrome or barely colorful, video cards offered text-only or blotchy color displays, and nobody even dreamed of watching video on-screen. Today, by contrast, most of the advances in the computer industry come from video equipment. Big LCD monitors, video cards with millions of colors and extremely high resolutions, digital camcorders with built-in high-speed interfaces, inexpensive Web cams delivering surprisingly smooth pictures: These are the video tools not only available but also almost ubiquitous today. Add these to constantly more powerful computers, and you have a video lover's feast.

Until, of course, something goes wrong with the picture.

Here, we'll examine the four most common categories of video hardware: monitors, video cards, digital camcorders, and Web cams. Under each category you'll find tips on setting up your hardware, using it, and troubleshooting it. Work through these tips, and the video portion of your computing life will take a strong leap upward. And given the importance of video to computers, that can only be a good thing.

Monitors

Interface professionals insist that the point-and-click system on your screen is the most important part of your computing life, but they're wrong. Your monitor is far and away the most significant interface you have. It's all but impossible to use a computer without one, and difficult, to say the least, if the monitor performs badly. Sit in front of an even marginally fuzzy display for three hours, and you'll see for yourself how crucial good monitor performance can be.

Setup

Size matters. Simply put, buy the biggest monitor you can afford, as long as it displays text crisply. The extra screen real estate lets you see more of your document or Web page, or alternatively gives you a larger picture at your old resolution. Before going to a 21-inch monitor, though, consider buying a second 17-inch or 19-inch monitor instead and using them in conjunction with Windows' built-in dual display feature. For this, you'll need either a second video card, as well, or you can just replace your existing video card with a new one that has two monitor ports. Windows will recognize the second monitor as soon as you install it, but you need to activate it through the Display Properties dialog box (available in Control Panel).

Drivers matter, too. Windows is great at recognizing monitors. Plug yours into your video card, start your PC, and you'll be up and running instantly. Unfortunately, Windows frequently defaults to the driver for a generic monitor, which works perfectly fine but doesn't let you fine-tune your monitor's performance. Go to your monitor manufacturer's Web site and download the latest driver for your monitor (and make sure it's specifically for your monitor) and then open the Settings tab on the Display Settings dialog box, click the Advanced button and then the Monitor button, and point Windows to your newly downloaded driver.

Use

Make a resolution. We can't emphasize enough how the right screen resolution can affect your entire computing experience. Don't settle for whatever Windows gives you: Open the Display Settings dialog box, click Settings, and experiment with a variety of resolutions by moving the slider in the Screen Resolution area. To see more of your document or Web page, choose a high

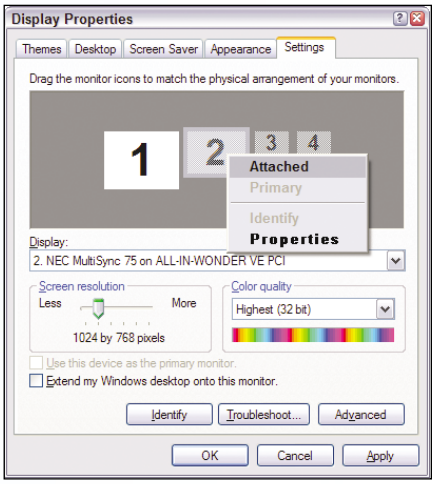
resolution (as high as 1,600 x 1,200 if your system allows it). To ease your eyes, lower the resolution to 1,024 x 768 or even further. And don't hesitate to change the resolution whenever your head demands it. Certain programs or documents look better at higher resolutions, but your eyes, especially late at night, might demand a lower resolution.

Turn on ClearType. Although designed primarily for LCD screens (especially laptops), the ClearType feature in Windows XP can make your display far more readable, smoothing out the fonts and giving them some body. In Display Settings, click the Appearance tab and then the Effects button. Choose ClearType from the second drop-down menu and click OK twice. The text on Web pages and Word documents suddenly looks a lot more like the printed page.

Learn your controls. Your monitor has a set of controls that let you adjust a variety of display elements. Typically, you access these on the front of the monitor case, by pressing a button or (less often) turning a dial. You have controls for brightness, contrast, and color adjustments, as well as controls for positioning the image on the screen (left, right, up, down) and expanding the width and height to cover the entire surface, eliminating most of the black borders. You can also adjust display shape from here (avoiding trapezoidal shapes, for instance) and rotate the display slightly to center it.

Troubleshooting

Increase the refresh rate. If you find your eyes hurting after even reasonably short sessions, try increasing the monitor's refresh rate. In Display Properties, click the Settings tab, the Advanced button, and the Monitor tab. Click the Screen Refresh Rate down button and choose a higher refresh rate. Windows typically sets this rate to a default of 60Hz, but many monitors can handle 85Hz, 100Hz, or even higher rates. If you choose a rate and your monitor blacks out, wait 15 seconds until Windows automatically cancels the request.



Activate the second monitor on a two-monitor system in Display Properties.

Get rid of wavy lines. If you see wavy lines on either side of the display, you probably have your speakers too close to the monitor. Move them farther away or buy speakers with better shielding. Cordless phones sitting near the monitor can also cause waviness.

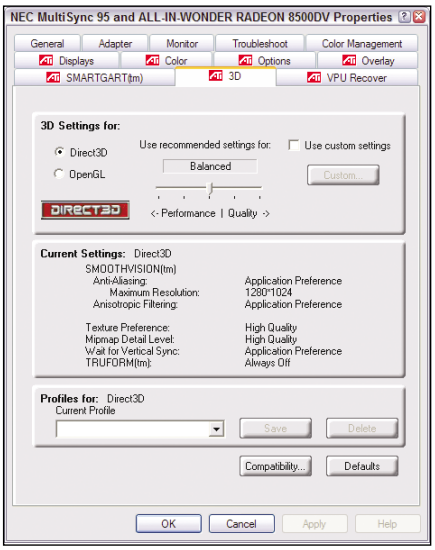
Test both monitor and video card. If your monitor shows signs of trouble (lines through it or black streaks or patches), it might be toast. Before tossing it, however, plug it into another video card (on your laptop or on a friend's PC), just to make sure the monitor, and not the video card, is the problem.

Video Cards

Also called graphics cards, graphics adapters, or video adapters, video cards make it possible for your monitor to display the text and graphics created by your PC's programs. Many PCs have the video system built into the motherboard, instead of as a separate card, but as long as you have an empty peripherals slot, you can add your own video card. Most video cards today come in the AGP (Accelerated Graphics Port) format, with only a few still available as PCI (Peripheral Component Interconnect) cards.

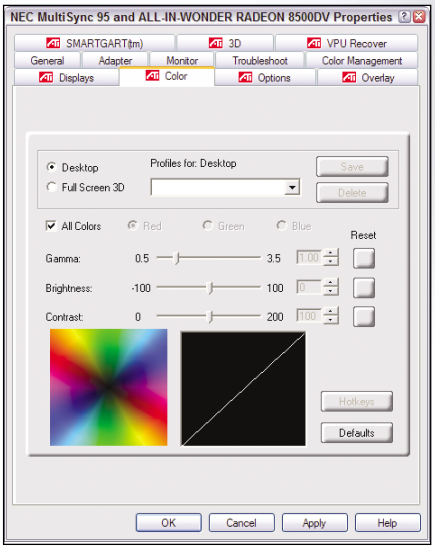
Setup

So many monitors, so little time. Many video cards support multiple monitors by including two VGA (Video Graphics Array) or DV (Digital Video) ports. To activate this feature, power down your PC, install the card, and attach both monitors (your main monitor to Port 1). Power up, wait for Windows to load, and then in Display Properties, click Settings. There you'll see two or more icons, each representing a monitor (or a monitor you could add later). Right-click the second monitor and choose Attached. Click Apply for Windows to perform the activation. Typically, you'll need to tell Windows where to find the driver for this monitor (as you did your primary monitor), so select the secondary monitor, click Advanced and Monitor, and install the proper driver. Note that you can have entirely different resolution and color quality settings for each monitor, and depending on the video card, you can use the second monitor for other purposes, as well.



The ATI AiW 8500-DV adds numerous tabs to Windows' Display Settings dialog box.

All this and TV, too. If your video card has a TV turner, you'll need to decide how to get the signal into the card and out to the television set. Most cards have a coaxial connector, to which you can directly attach the incoming cable or satellite dish, but if you wish, you can run standard RCA cables or S-Video connections into the card instead. Your



You can set colors precisely using the ATI configuration software and then save the configuration to a profile.

choices coming out of the card include RCA and S-Video, as well, so the question becomes, quite simply, what quality of image you want; S-Video is better. Some video cards have external adapters that plug into the card and into which you plug all of your cables, making the process easier to manage.

Usage

Use the tailor-made software, Luke. Video card manufacturers, such as ATI, Matrox, and NVIDIA, always include configuration software that installs with the driver. You can find this software in the Control Panel and/or the System Tray, as well as in the Display Properties dialog box. In Display Properties, click the Settings tab and then the Advanced button, and you'll see your adapter-specific settings on one or more tabs.

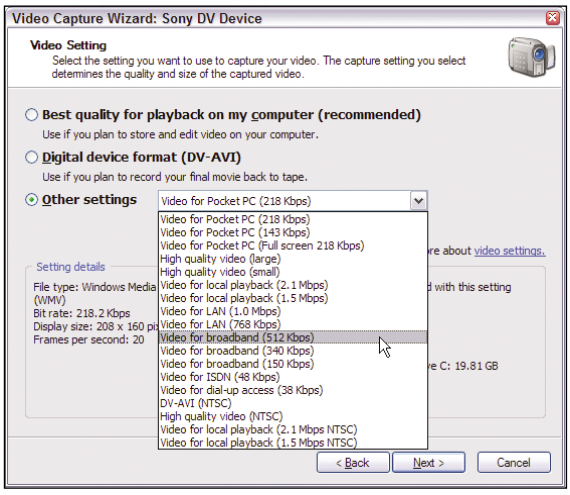
If it ain't broke, don't fix it. Most of us want the latest drivers for all of our hardware. Good idea, except that sometimes either the drivers are buggy or they don't get along with other software on your PC. If you're happy with your video display as it is, don't upgrade the drivers. It's as simple as that.

Troubleshooting

Not as advertised. If you bought a video card for a specific resolution and you don't see that resolution in the configuration dialog box for the card or in the Display Settings dialog box, download the latest driver from the manufacturer's Web site or install it from the CD that came with the card. This is especially true for WinXP, which often defaults to an older driver upon installation. But even with the right driver, it's possible—as with some games—that your monitor won't be able to handle the load anyway, in which case, assuming you installed the correct driver for your monitor, the resolution setting will be unavailable anyway. In that case, you'll have to buy a new monitor if you want to work at that resolution.

Steady as she goes. Sometimes a video card can cause your monitor's display to jump around and even cut in and out as if it can't quite get a good connection. Make sure the cable from the monitor is plugged securely into the VGA or DV port on the video card. If so, power down the PC, open the case, and make sure the video card is properly **seated** (pushed down completely) in the AGP or PCI slot on the motherboard. To help further, remove the card from the slot and clean it (as well as other slots) with a small brush or a gentle air blower. Dust can cause nagging difficulties, and PCs love collecting dust.

Fried with that? You bought a spiffy new video card, installed it, and two months later your monitor started going wonky, seemingly unable to stabilize the display or with the display sometimes just disappearing completely. Your replacement monitor worked well for two months and then showed the same symptoms. Guess what? Your video card might be the problem. Although rare, we've seen cases where a video card effectively fried more than one monitor before the user tried changing cards instead of monitors. Rule of thumb: If you lose one monitor to damage, you can assume it's the monitor, but to be safe, buy an inexpensive replacement video card along with the monitor; have the video card checked out by the manufacturer, and if it's fine, then you have two video cards available, never a bad thing. Or you can do what several people have done, wait until you lose a second monitor before acting, but that's not pretty.



Windows Movie Maker lets you select from a variety of settings when you capture the data from the camcorder.

Digital Camcorders

If you want to make the best use of your computer's video capabilities, and make yourself a high-powered movie mogul at the same time (well, high-powered in your own house, at least), buy a digital camcorder. Available in many shapes and sizes, and in a range of prices, digital camcorders feature interfaces—usually FireWire or USB 2.0—that let you connect directly to your PC and download and upload video. Combined with a video-editing package and a DVD burner, your digital camcorder lets you create videos, complete with soundtracks, to play on your standalone DVD player or share over the Web.

Setup

FireWire, USB, or USB 2.0? Digital camcorders have three primary interfaces:

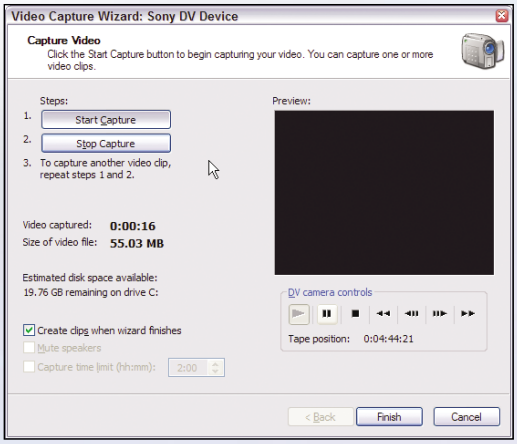
FireWire, USB, and USB 2.0. To use one of these camcorders with the full slate of features, including direct control (Play, Rewind, Fast Forward) of the camcorder from the PC, the original USB isn't fast enough, so you need either FireWire or USB 2.0; the original USB simply isn't fast enough. Of these two, FireWire remains dominant, but be sure to check before buying your camcorder. If you don't have the correct interface on your PC, you'll need to buy a FireWire or USB 2.0 peripheral card, which you install inside your PC to give you one or more ports of this type. In fact, to get the best performance from your camcorder, buying a separate peripheral card is always a better idea than relying on those that attach directly to the motherboard.

Lights! Camera! More lights! No camcorder, no matter how good, can give you a decent recording if it doesn't have enough light to work with. You might be able to see that piano player up on the stage, bathed in the soft blue spotlight, but your camcorder probably needs more light than that. With a digital camcorder, you can record the scene exactly as is and use filters during download and editing to brighten the image, but this won't substitute for setting up better lighting in the first place. Work with your subjects to make this happen—ask for brighter lights for a short duration, for instance—and then download the film you've captured to a notebook and watch it to see if you need more. If the event is important enough, in fact, taking a notebook along with you can prove a godsend, because you can get an idea of what the video will look like before you record it to DVD or upload it to a shared folder on a Web site.

Usage

It's the Web, not a cinema. Although it would be nice to offer the best quality video footage to anyone who wants to see it, if you're sharing footage over the Web, you need to cut down the data resolution. Most video-editing packages give you a range of settings when initially capturing the video from the camcorder, including those perfect for sharing small video files over the Web. Choosing the lower-quality settings dramatically reduces the size of the files (to say the very least), to the extent that downloading, especially over a slow Internet connection, becomes almost bearable.

Zoom zoom zoom. Zooming is great; you can stand at the back of the room and bring the subject closer. Problem is, you can easily lose quality as a result. The higher the zoom, the steadier you have to hold the camcorder, so by all means buy a tripod. More importantly, if your subjects are moving frequently, turn off the auto-zoom feature because the constant adjustments will annoy anyone watching your video footage. Including you.



Set the exact tape position and range to start and then control the camcorder from Windows Movie Maker.

Control from afar. With a digital camcorder and a FireWire or USB 2.0 connection, as well as the right driver, you can control the camera directly from the PC. This interface gives you sharper control over the video, because it eliminates the possibility of jarring the camcorder with your hands. You can also easily specify segments of the video based on the recording's position.

Delete only when necessary. Whether you record your video footage on tape or internal memory, try to avoid deleting it until you're absolutely certain you have copies of the original data. To accomplish this, import all video twice and store the two files in separate locations on your hard drive or, ideally, on two separate drives. Even more than still photos, which you can retake on some occasions, you can rarely recapture video. You can delete video directly from the PC interface, so be careful not to even though you think the production you're working on looks perfect. Eventually, you may want the original footage again.

Buy a microphone. Yes, your camcorder has a built-in microphone. No, it's not the best microphone ever made. If you need high-quality audio recording, buy an external microphone worth between $50 and $100, and you'll hear the difference immediately. In fact, get a mic stand to go with it, and enough cable to connect to the camcorder, and you'll get even better sound. To make sure no one trips over the cable, tape it to the floor.

Troubleshooting

It chops! It slices! It gives you a headache! Your video might look fine when you play it back on your LCD display, but suddenly you find it choppy and uneven after transferring the footage to your hard drive. One way to help fix the problem is to defragment your hard drive, using either third-party software or the Defragmentation tool in Windows XP. Right-click the drive in My Computer and click the Defragment Now button from the Tools tab. Another option is to buy a larger, faster hard drive, and in fact, this is probably the best single purchase you can make after the camcorder itself. Video files are huge, and they demand consistent hard drive performance. A nice 120GB or 200GB drive with a high-speed disk controller can make your video capturing and editing life far simpler, and more importantly, far less frustrating. CE

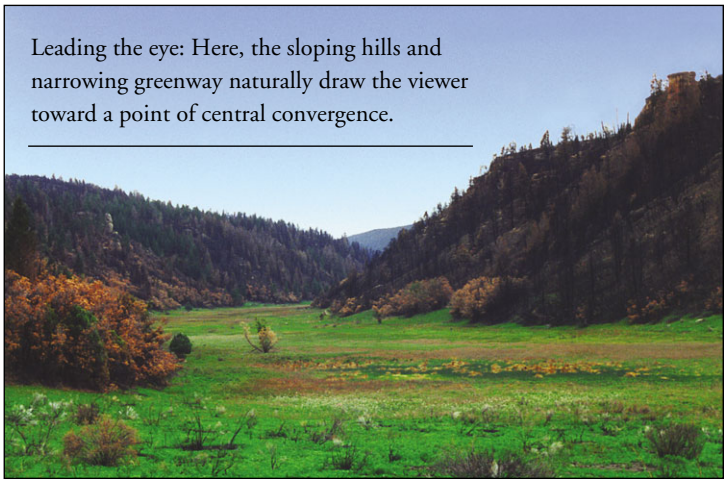
BY NEIL RANDALL

As Big As All Outdoors

Expand Your Ambitions With Landscape Photography

A well-shot landscape photo conveys a sense of timelessness. Yet to those who have an affinity for the natural world, it possesses the potential for as many mood shifts as any human model. A woodland grove that looks cheerful and inviting in warm sunshine might turn foreboding under dark clouds. Shoot the grove in April and again in October, and you may not even recognize it as being the same place.

Just as any outdoor vista is made up of numerous features, an effective likeness is the result of several artistic choices: time of day and lighting, compositional balance, and more. Work with them effectively, and you can go a long way toward revealing the boundless variety of your natural environment.



Leading the eye: Here, the sloping hills and narrowing greenway naturally draw the viewer toward a point of central convergence.

Equip For The Expedition

Taking along the right gear—and the right attitude—will help you get the most from your excursion.

Camera. Obviously, you'll work with what you have. For most people halfway serious about photography, that's a 35mm film camera, an equivalent digital SLR (single-lens reflex) model, or other higher-end digicam. And you can definitely get great results from digicams, particularly if they have a mode providing manual control over aperture, shutter speed, and focus.

But in magazines, galleries, and elsewhere, the more breathtakingly detailed landscapes you see are often shot with medium format (6 x 6cm or 6 x 7cm) or large format (4- x 5-inch, 8- x 10-inch) cameras. Because their negatives are so much larger than 35mm film or digital image sensors, they can soak up much more detail. So keep your expectations reasonable. You're not going to outdo Ansel Adams (America's best-known landscape photographer) with a camera you can wield with one hand.

Lens. Landscapes and wide-angle lenses naturally go together. (Examples of regular wide-angles are lenses with focal lengths between 24mm and 35mm. Ultra-wide-angles are between 14mm and 21mm.) A wide-angle lens will help you pull in more area, although it can also appear to push foreground objects farther away than they really are. Also, the shorter the focal length, the greater the tendency of the lens to distort the view, making foreground elements appear to curve, although with landscapes this usually isn't noticeable, or at least problematic, until you get to extremely short focal lengths.

When sharpness is critical, you'll often find that a prime lens (fixed focal length) will deliver superior performance to most wide-angle-to-telephoto zoom lenses that are standard-issue with camera bundles.

Still, don't leave your telephoto lenses at home. They, too, can come in handy if you want to zero in on a feature you can't get close to.

Film. Slow film uses a finer grade of silver than higher-speed films, and this can give your prints crisper definition. ISO 200, 100, and slower speed film is often unsuitable for indoor shooting (without a flash, at least) but excels outdoors in daylight. With digicams, try the equivalent ISO settings.

Tripod. Shooting across distances means capturing lots of small details; keeping the camera stable will minimize the risk of blurring them with camera movement. For further stability consider the hands-off benefits of a cable or other remote shutter release or use the camera's built-in timer. (If you're shooting with an SLR whose viewfinder uses a mirror, another feature that can help retain sharpness is the ability to lock the mirror in its up position after you've composed the shot. In critical cases, as the mirror swings upward to clear the path between the lens and the film or sensor, its movement can introduce a tiny bit of blur.)

Lens hood. This is a plastic, rubber, or metal assembly that fits onto the front of a lens assembly. When the sun is in or just outside your frame, a hood helps block light rays from striking the lens surface and causing glare and lens flare.

Filters. There are many types of filters that alter color and light, but for landscape photography, two can be especially helpful:

A **polarizer** reduces or eliminates glare and reflections off water, glass, and other shiny surfaces, often leaving the colors beneath those surfaces more vibrant. It also has the effect of darkening the sky (and accentuating clouds), letting you capture a richer blue instead of a pale or colorless expanse.

A **neutral density filter** reduces the amount of light entering the camera. This can let you use wider aperture settings (to reduce depth of field) or longer exposure times (to achieve a blur from something in motion) than you otherwise could under well-lit conditions. A **graduated neutral density filter** reduces light by different amounts from top to bottom. It's often used during the early morning or late evening, when the sky may have ample light but the ground is darkened, to even out the exposure for both. A hard version has a clear demarcation line—dark on top, clear on the bottom—and is best matched with a distinct, level horizon. A soft version fades gradually from top to bottom and works better with a broken or irregular horizon.

In this shot the horizon line falls in the center, giving equal emphasis to land and sky. The low scrub anchors the foreground, while the lake acts as a midground zone before the mesas in the background.

Hyperfocal distance. Last issue, we did an entire feature on HFD (hyperfocal distance), so refer to that for the details and a chart with several hyperfocal distance settings. To recap, it's a tool for maximizing depth of field, the region of a photo that's in acceptably sharp focus. Figuring the HFD for a given combination of lens focal length and aperture setting will help you identify the nearest point you can focus on while extending the focus to infinity. If your lens isn't equipped with a distance scale that will pinpoint hyperfocal distance, a chart is an excellent alternative.

Cleaning supplies. The great outdoors means dust, grit, and other crud. Make sure you can safely clear them from your camera with compressed air, an air-squirting bulb brush, or microfiber cloth (many professionals give a thumbs-down to lens tissue). Carry a waterproof bag, too, in case you get caught in a cloudburst.

A landscape doesn't have to be a sweeping vista. Zeroing in on one feature can draw out smaller details, such as intricate shapes and textures.

The Lay Of The Land

The elements of a landscape seem self-explanatory: land, and plenty of it. Beyond that, it gets trickier, with different schools of thought holding fiercely conflicting opinions on what is and isn't acceptable to include in the shot.

Some say human beings should not appear at all; others say it's okay if they're there to provide a sense of scale. Some go so far as to mandate avoidance of anything that humankind has built or shaped, while others allow for buildings that have become ruins; still others find even the smokestacks and iron frameworks of an industrial landscape perfectly valid. Some say that a seashore doesn't qualify as a proper landscape, and others . . . well, you get the idea.

Unless you're shooting to please someone with strict ideas already, it's best to forget about dogma and prohibitions and set about capturing what resonates in your heart and imagination.

Composition Of A Scene

The main thing to beware of in landscape photography is letting yourself become happily overwhelmed by the surrounding grandeur. You'll know it's happening if you start thinking you just need to point in any direction and the camera can't help but capture something wonderful.

Instead of eyeing the whole vista, narrow your attention to one or two aspects of it. This could be an individual feature: a stalwart tree, a rocky outcropping. Or, it could be the way the land unfurls before you, with obvious relationships between shapes and structures.

Whatever it is, start with a clear idea of your focal point. Then look for two

When photographing moving water (or windblown trees), shutter speed can make a big creative difference. At left, a fast shutter (1/60 second) freezes the turbulence. At right, a slow shutter (one second) blurs the stream into gentle, silky undulations.

things: ways to simplify it and ways to accentuate it. This may involve moving closer so your subject occupies a larger area of the frame or circling around to keep background clutter from becoming a distraction. To maximize clarity in your depth of field, try lining up the shot so its major elements occupy the same plane, or close to it.

It will help here to have a tripod with a quick-release plate that screws onto the bottom of your camera. This will let you roam as needed, trying different perspectives. Then, once you find something that looks promising through the viewfinder, you can quickly set up the tripod and secure the plate in the tripod head.

A few pointers:

- Try to lead the viewer's eye into the shot. A pathway will establish a line of motion the eye will automatically follow. Natural features such as ridge tops (when shot from above) and creeks perform the same function.
- Although portraits can get away with placing a subject center-frame, landscapes will invariably look more interesting with their subjects off-center. A good starting point is the Rule Of Thirds: aligning elements with the one-third and two-thirds points in the frame, vertically or horizontally.
- Be aware of where you're placing the horizon line. Low placement will emphasize the sky; high placement will emphasize the land.
- As you compose a shot, think in terms of regions: definitely the foreground and background, and possibly the midground, too. Having distinct elements in each region will lend the scene greater depth. For instance, a fallen log might dominate the foreground, while a river occupies the midground and rocky crags rise in the distance. Strive to keep things balanced so that one element doesn't overpower the rest.
- Because of their tendency to flatten depth and reduce apparent distances, telephoto lenses are useful for creating pattern-based shots, such as compressing an expanse of tree trunks into an array of overlapping columns.

By The Light Of Day

Between dawn and dusk, the light can change according to dozens of variables: the sun's position in the sky, high clouds, low haze, and so on. Ansel Adams was renowned for waiting days to get the optimal light for a single shot. Few of the rest of us have the luxury of that much time.

Some general guidelines can help you get the most from your time outdoors:

- On cloudless days, early morning or evening light is more useful than when the sun is directly overhead. The shadows created by the oblique rays during these times of day can, for instance, vividly bring out the shapes of rolling hills.
- Cloudy days result in low-contrast settings, letting you shoot longer exposures that can make colors really come alive.
- The reflective properties of snow (and, to an extent, mist) can fool your camera's exposure meter into thinking there's more light than there actually is. To compensate, overexpose the shot by slowing the shutter or widening the aperture. To hedge your bets, try **bracketing**—shooting multiple exposures at different settings to make sure you find the best one.
- Just as time of day affects the sun's position, so does the time of year, with the sun lower in the sky during spring and fall than at the height of summer. Late afternoon autumn light is especially warm and glowing.

Into The Sunset

Landscapes are among the world's most agreeable photographic subjects. They're always around when you get an itch to click a shutter. They never act impatient while you meticulously compose the scene. And they never feel insulted if your experiments have gotten unflattering results. So shoot away and enjoy the company. CE

BY BRIAN HODGE

Lighten Up.

It wasn't so long ago that if you wanted to bring your data with you, your hardware had to come too. Well, that's all in the past now thanks to the new SanDisk Cruzer™ Mini. At under half an ounce, the Cruzer Mini goes anywhere, and with up to 256MB of flash memory, it takes a lot with it. Hi-speed USB 2.0 compliant, SanDisk's Cruzer Mini lets you transfer data faster than ever before. And at less than 8mm thick, all it needs is a single USB slot. Just drag, drop, and go. It's all about convenience – no extra hardware, no worries.

So whether you're installing utilities or updating print drivers for the umpteenth time, you can take your files with you wherever you go – and you won't even need your dolly.

For more information on SanDisk Cruzer Mini, visit www.sandisk.com/smart

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Unexpected Developments

Quick Fixes For Digicam Problems

One of the virtues of digital photography is the promise of a level playing field for amateurs and professionals alike. Prosumer digital cameras, and many high-end automatic cameras, come packaged with powerful tools such as exposure histograms, matrix and spot metering, white balance profiles, and adjustable ISO settings. Editing software bundled with your camera can correct many or all of the deficiencies that once came standard with even expensive develop and print services: blemishes, graininess, washed-out color, poor dynamic range. Combine all these utilities with the professional photographer's secret weapon—lots and lots of shots of the same subject—and you can work at a professional level, almost effortlessly.

Slow down there, Ansel. Maybe it's not quite that easy. The road to great artistic achievement in photography is paved with frustration, self-doubt, and technical difficulties. In the interest of making your journey a little less bumpy, this article will navigate a few of the many potholes you may encounter on your way.

Problem: My photos look terrific in Photoshop, but when I print them, they look like landscapes from Bazoonga-5, the Planet of the Purple Suns. How can I fix the colors?
Solution: Whoa. You have opened up a serious can of oddly tinged worms here. Lengthy tomes have been penned on the subject of color management, the fine art of getting the prints on your screen to look like the ones coming out of your printer. The process may entail matching your monitor to your printer, matching your printer to your monitor, or matching both with existing prints or slides. Along the way, you could end up profiling and calibrating your monitor, profiling and calibrating your printer (on a particular paper stock), adjusting output settings in Photoshop or whichever program you use, or installing color profiles and print drivers. If you really want to get it right, buy calibration software such as ColorPlus ($119; www.colorvision.com).

Problem: The soot in my charcoal incinerator comes out blurry when I photograph it in a dark room. How can I fix this?
Solution: If autofocus isn't working in low-light conditions, it's probably because your camera doesn't have an **AF (autofocus) illuminator**. An AF illuminator, built in or as part of an external flash, is a lamp that projects a beam of visible or infrared light out toward the subject to assist in contrast detection, which the camera uses to focus. If your camera doesn't have a built-in AF illuminator, it may support an external flash. If not, use manual focus if you have the option or just stay outside. We should mention that autofocus is hardly perfect in bright light either. It can be stumped by small or moving subjects, low contrast, or the tricky light coming off a waterfall or Pink Floyd laser show. If you can't focus manually, adjust the aperture to its smallest setting and hope that the increased depth-of-field will compensate for poor focus. Slight blurs, as mentioned above, can also be addressed in image-editing software with sharpening filters; Unsharp Mask is generally the most useful.

Problem: Either my memory card or my camera is busted, man. Sometimes it won't let me format the card; sometimes it won't let me review my pictures after I take them; sometimes it says the card is full but doesn't show any pictures on it. How much can I get for this junk on eBay?

Solution: Don't list it just yet. Your problem might be nothing more than dirty electrical contacts. Try sliding the card in and out a few times to clean them off. Refugees from the Nintendo generation will prefer to blow on the contacts; a can of compressed air is even better, or use a clean dry cloth if you can get it in there. If your contacts are clean, have you been foolishly removing the card while the camera is accessing it (usually indicated by a red LED [light-emitting diode])? Doing so will wreak all kinds of havoc on the file structure and will require a reformatting. If you want to try and save your pictures first, run a file recovery program before the format (which we'll discuss soon).

Refugees from the Nintendo generation will prefer to blow on the contacts; a can of compressed air is even better.

Problem: My digital camera guzzles batteries like the Cookie Monster eats macaroons. How can I conserve power?

Solution: There are two categories of battery-extending options: things you can do to make your current battery last longer, and things you can do to make sure you buy the right batteries the next time around. Here are some ideas in the first category:

1. Don't use the burst mode (rapid sequence of photos) unless you really need it. Take some time to compose your shot first.
2. Turn off the LCD and use the viewfinder like photographers have been doing for thousands of years. The LCD is a huge battery drain. Some cameras, such as the HP Photosmart 120 series, won't let you switch off the LCD, but they have a Dim setting that's better than nothing.
3. Turn off the camera after every shot. It really doesn't take so long to turn it back on, and you probably don't take a picture every three minutes.
4. Easy on the zoom. Try ambulation instead.
5. Buy an external battery pack that plugs into the digicam's AC adapter. These are surprisingly difficult to find in stores; order it online and make sure it's compatible with your make and model.
6. Carry extra batteries.

These Maha Powerex 2300 mAH (milli-amp hours; 2.3 Amp-hours) Rechargeable NiMH batteries are hard to beat at $15.95 for a set of four.

Better yet, pick the right batteries in the first place. The real problem with digital cameras is that they draw a lot of current in short spikes, making the batteries useless much quicker than lower, continuous currents would. A typical 1.5-volt AA alkaline battery is rated for about 2.4 **Amp-hours** (an Amp-hour is one hour's worth of current of one Ampere, enough for two 60-watt bulbs). Because of the relationship of voltage, current, and electrical resistance (Voltage = Current x Resistance), the battery's internal resistance burns up more voltage at high currents than it does at low currents, dropping the output voltage further. When the output voltage drops below a certain point, your camera won't work anymore. High currents speed up your battery's arrival at this point of no return.

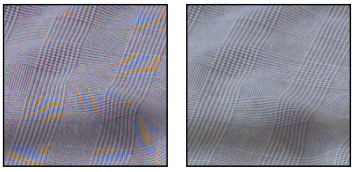
Duracell Ultra and similar batteries are considerably better in cameras than regular alkalines, and lithium batteries better still, but by far the best value you'll get is from rechargeable batteries, either NiMH (nickel-metal hydride) or nickel-cadmium. (Rechargeable lithium-ion batteries, different from lithium, offer several advantages in weight and capacity, but they can't be fashioned into typical AA sizes and voltages. Some cameras only accept proprietary lithium-ion battery packs.) These batteries actually have smaller capacities than most alkaline batteries, but they last much longer in high-current applications because their internal resistance is much smaller.

Charging can take a minimum of a couple of hours or may take all night; you can do better with some batteries using high-current chargers intended for battery packs in high-drain devices, but don't try it near the drapes. Maha, RipVan100, Sanyo, and many other brands make good rechargeable batteries and chargers. Decent batteries will run you $2 to $5 a pop; most chargers fall in the $10 to $30 range.

If you can't get closer to your subject or tell Uncle Jack to lose the tweed, you're probably out of luck with your current camera.

Problem: **Weird ripples of colors that aren't really there appear in my pictures when I'm cataloging my Seersucker collection.**

Solution: C'est moiré, sounds like to us. **Moiré** is a digital artifact produced by the interpolation algorithms most digital cameras use to capture three colors at every pixel in the image sensor. The electronics in image sensors can only record the intensity of **incident light** (light that strikes an object, rather than reflected light); they don't measure the wavelength of incoming photons to determine their colors. In order to record color information, manufacturers put a different colored lens over each pixel: red, green, or blue. After a picture is taken, the camera's processor attempts to guess the intensity of the missing two colors at every pixel by averaging the intensities in nearby pixels where it was actually recorded. When patterns such as those in your Houndstooth blazer, or sometimes in your subject's hair, have features too small for this averaging to work correctly (smaller than one-half the size of the sampling frequency, to be precise), voila! Moiré.

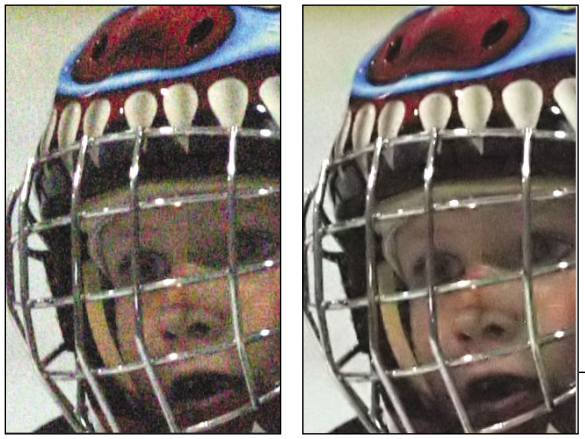


These shots from Foveon's Web site illustrate an unwelcome visitation from moiré.

If you can't get closer to your subject (thus increasing the feature size) or tell Uncle Jack to lose the tweed, you're probably out of luck with your current camera. Many high-end cameras come with built-in anti-aliasing filters to eliminate moiré and similar artifacts by removing high-frequency (small) patterns from the image, thus reducing the resolvable feature size—in other words, blurring the picture a bit. (You can correct for some of this blur with an Unsharp Mask filter in software.) You may be able to find an external anti-aliasing filter for your model, but be prepared to pay handsomely. Alternatively, you can shell out some extra clams for a professional-grade digital camera with three image sensors, one for each color. More reasonably priced are Polaroid and Sigma cameras with Foveon's moiré-proof X3 sensors. A single X3 sensor manages to record all three colors at every pixel location by taking advantage of silicon's tendency to absorb different colors at different depths.

Problem: **My snapshots of fireflies are kind of speckled-looking. How can I fix this?**

Solution: The speckles, called **noise**, are to be expected under low-light conditions. Your camera may be automatically increasing the ISO setting, analogous to film speed in a conventional camera, in order to capture more light faster. Unfortunately, larger ISO means more digital noise. Because a higher ISO setting results in a picture with less actual light gathered from the scene, there is less genuine information to drown out the tiny random fluctuations inherent to the electronics. (To understand this, imagine timing a frictionless roulette ball rolling around and around the wheel. You'll get a much more accurate estimate for the lap time if you time 10 laps and divide the answer by 10 than if you time a single lap. The random timing error is the same in both cases, but the **signal-to-noise ratio**, the ratio of correct information to random errors in a digital image, is much larger in the second case.) To avoid noise, shoot at the lowest possible ISO setting; this will require a longer shutter speed, which may mean getting a tripod. If you already have noisy photos, good antinoise filters are available as plug-ins or standalone applications from companies such as Neat Image, Noise Ninja, and others. Do-it-yourselfers can try making several identical shots of the same scene, rendering them semitransparent in Photoshop, and stacking them on top of one another.



Filters such as Neat Image can smooth out noise in preexisting photos, but real photographers prefer just getting a clean shot in the first place.

National Geographic will never pay me for these.

Problem: My kangaroo pictures are all tail and no pouch! I don't understand. I know I framed the shots perfectly at the time. *National Geographic* will never pay me for these.

Solution: Digital cameras are notorious for lags: startup lags, shutter lags, and **post-capture lags** (the delay after a shot until you can take the next picture, during which time the camera is offloading data from the sensor, interpolating, compressing, etc.). The shutter lag, half a second or more, is perhaps the most troublesome, being as it is more than enough time for a restless subject to hop, skip, or jump right out of the frame. Besides anticipating the action, your best defense against lag is manual focus and exposure, if you can keep up. If not, follow your subject with the shutter halfway depressed, which will get the autofocus, autoexposure, and white balance set in advance. With these out of the way, you've eliminated a large contributor to lag, though not quite all of it. Of course, continual refocusing will run down your batteries pretty quickly, so use this trick sparingly. Fortunately, camera manufacturers are energetically stamping out the causes of digital camera lag, making cameras faster every year.

Problem: Barbara looks radiant when I shoot her in the rock garden, but she looks a bit anemic in my indoor shots. How can I fix this?

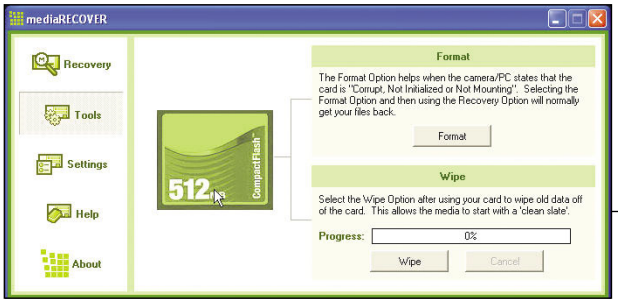
Solution: You have a white balancing problem. The human visual processing system, evolutionary zenith that it is, tends to compensate automatically for subtle color shifts under different lighting conditions—meaning that the apple in your hand looks pretty much the same color to you when you remove it from the fluorescently lit fridge, carry it through your incandescently lit kitchen, and eat it on your sunlit porch. The camera records the truth: The spectrum of light bouncing off that apple isn't really exactly the same in all those places. White balancing corrects this problem by rotating the color wheel a bit, rendering the captured scene more comfortable to human interpreters. Your camera might have two white balance profiles, Indoor and Outdoor, or it may offer a host of them: Sunny, Cloudy, Flash, Incandescent/Tungsten, Fluorescent, Auto, and Manual (on the Manual setting, you point the camera at something and tell it that this object should be colorless). Pick the best one for your lighting condition or leave it on Auto for pretty good results. You can correct white balancing problems later, in software, but it's always better to get the colors as natural as possible when you shoot the picture, not after.

The camera records the truth.

The satanic reddish cast in this poorly white-balanced picture is probably not what the photographer intended.

Problem: I just erased all the pictures of Janine's wedding on my memory card. I realize she should have sprung for a professional photographer, but still, this looks pretty bad.

Solution: Cheer up. When you delete data from nonvolatile digital memory (ROM, Flash media, whatever), all is not lost. Even if you've reformatted, screwed up your card by removing it in the middle of a shot, or otherwise corrupted the media, information may still be recoverable. All the ones and zeros that compose your image are still burned into those transistors, unless, of course, you've proceeded to save other data on top of them. What's really happened is that you've lost the reference to the files in the table of contents (the FAT, or File Allocation Table), so normal software can't see it anymore. A smart piece of software, though, should be able to comb through the card, pull out large chunks of bits that look suspiciously like files saved in a particular format, and restore all the correct references in the FAT. That's exactly what a whole host of un-deleting programs do. Query Google for "digital photo recovery" or try DataRescue's PhotoRescue ($29; www.datarescue.com), JufSoft's BadCopy Pro ($39.50; www.jufsoft.com), or MediaRECOVER's flagship product ($29.95; www.mediarecover.com).



If your camera's memory card won't let you access your photos, try using a specialized program such as mediaRECOVER to pry them out.

Problem: As a distinguished paparazzi, I appreciate the value of celebrity cellulite in high resolution. Because bodyguards the size of Zambonis usually prevent me from getting too close to Brit and Christina, I find myself using the digital zoom feature on my camera a lot. There's no problem, I just wanted to let you know.

Solution: Actually, there is a problem. While close-up capability is a must for the professional photographer, digital zoom is not the way to go. Digital zoom and optical zoom are very different things. A true optical zoom lens magnifies the image on the way into the camera, gathering extra information about a small portion of the captured scene. Digital zoom, on the other hand, is the exact in-camera equivalent of cropping and blowing up a piece of your photo. It introduces no new information and cannot resolve any extra detail. There's nothing wrong with cropping. Many professional images have been cropped at least a little bit. But if you're going to crop, you may as well do it later when you have time to do it right (it's easy enough using any editing software). Most cameras will find it harder to focus and set exposure while they are digitally zoomed on a scene, meaning a digitally zoomed picture stands a good chance of coming out worse.

Problem: My old analog lenses fit my new digital SLR (single-lens reflex), but my wide-angle lens isn't as wide as it used to be. What's going on?

Solution: Regardless of the number of megapixels it can handle, the sensor in a digital camera is physically smaller than the surface taken up by a 35mm film negative. This means that, when the scene outside the lens is projected onto the back of your camera, a digital sensor captures a smaller piece of it than a film camera does. If you print both images at the same size (say, 4 x 6 inches), then the digital camera has, in effect, zoomed in a little bit on the part of the scene in the middle of the picture. What this means is that zoom or telephoto lenses adopted for a digital camera will suddenly see their magnification increased, usually by a factor of around 1.5. Wide-angle lenses, however, will become less wide by the same amount: 20mm becoming 30mm, for instance.

Because focal lengths become meaningless without a standard sensor size, digital camera specs usually list their focal lengths as 35mm equivalents. As a side effect, this effective decrease in focal length increases the depth-of-field (the amount of the scene that can be in focus simultaneously), making landscapes easier and portraits harder to shoot. There's no way to get around this effect, for better or worse. The only solution is a lens with a shorter focal length, if your old one doesn't cut it anymore.

Hopefully we've touched a few of your nagging questions in this article. As savvy as we are here at *CE Tips*, however, it's possible we didn't cover everything. If you are still wanting satisfaction, stay calm, because the odds are very low that your problem is in any way unique—the world has seen it all before. Try taking the camera back to the store where you bought it, or to a store where you can pretend that you bought it. If it's an easy problem to fix, a salesperson will probably do it for you on the spot. You might also try calling up tech support. And if all else fails, as the saying goes, read the directions. CE

BY RYAN TURNER

Bend Light To Your Will

Use Filters To Enhance Your Photos

Photography is an art that is deeply rooted in science, specifically physics. The way a camera captures a scene depends upon how the camera perceives light waves that are received by the lens and then by the film or, in either a digital camera or digital camcorder, by the image sensor. By changing the camera's perception of light, it's possible to improve or add special effects to the appearance of the final photo or video.

When the equipment permits it, you can create this perceptual change with changes to the camera's main settings: the **aperture setting**, which determines the size of the opening that lets light enter from the lens, and the **shutter speed**, which determines the length of time the aperture stays open. Both settings together determine the amount of light that enters the camera.

But setting the aperture and the shutter speed are not the only ways to play with the light that enters the camera. Another way is to use a camera filter, an addition to the lens that alters the light before the lens sees it. With a filter, it's possible to increase or decrease sharpness, change contrast, enhance colors, or add light elements, such as a halo, in the captured image.

The variety of filters available is tremendous, and by attaching more than one type of filter to a lens, it is possible to combine their effects.

Experts caution against trying to be too creative with filters, however, for at least a couple of reasons. First, the use of too many effects can create a visual mess. Second, by adding a filter, you may force a change to the camera's exposure setting.

"In their most successful applications, filter effects blend in with the rest of the image to help get the message across," explains Ira Tiffen, the former vice president of research and development at Tiffen, one of the world's largest camera filter makers, in a tutorial about filters posted at the company's Web site (www.tiffen.com/camera_filters.htm). Filters enhance an image in any number of ways and add an emotional or visual punch to your photos.

Because a filter can decrease the amount of light coming into the camera when one is added, it may be necessary to increase the size of the aperture opening, advises Serge Timacheff, the lead author of "Total Digital Photography: The Shoot to Print Workflow Handbook," which is expected to be published this October. Timacheff, who is a professional digital photographer, says that a user should advance the aperture opening (measured in f-stop settings) by one or 1.5 stops for each filter added. The reason, he says, is that any filter will limit, to some degree, the amount of light going into the lens.

It's easy to know what the exposure adjustment must be because these filters come with a recommended "filter factor" or a stop value. Stop values denote the number of f-stops by which the aperture opening should be increased. A filter factor of 2 equates to a one-stop increase.

Another number to be aware of is the **filter grade**, which indicates the degree of the filter's effect. Filters with a higher filter grade number have a stronger effect than filters with a lower number. However, there is no direct relationship between filter grade numbers and the strength of the effect, according to Tiffen, meaning that a filter grade of two is not necessarily twice as strong as a filter grade of one.

These technicalities aside, it is important to remember that the effect imparted upon an image by a camera filter is permanent, notes Daniel Grotta, president of DigitalBenchmarks (www.digitalbenchmarks.com), a digicam and imaging test lab and consulting service. And the permanence of the effect will limit what can be done to the photo with image-editing software later, Grotta adds.

UV/Protective Filter

The most basic type of filter is a UV (ultraviolet) filter. It reduces the amount of ultraviolet light entering the lens and prevents white objects from taking on a bluish hue, says Sally Smith Clemens, product manager at Olympus America. The effect of the UV filter is more visible in images shot in the shade than in sunlight, but the difference is very subtle.

The UV filter is important for nearly all shutterbugs to use, says Grotta, because it is difficult to reproduce its effect (removing unwanted, pronounced blue hues) with image-editing software such as Adobe Photoshop.

It's a good idea to always leave the UV filter on the lens, experts say. And doing so provides a secondary benefit: protection. "Like a motorcycle helmet, sometimes the filter will take the hit and break instead of the lens" if the camera is dropped and there is an impact to the front of the lens, Timacheff says. Priced at around $10 each, UV filters are inexpensive and are available at any camera store.

Neutral Density Filter

Whereas a UV filter absorbs only invisible ultraviolet light, an ND (neutral density) filter absorbs a certain percentage of light across the entire spectrum of visible light and lets the photographer maintain a particular aperture setting in very bright light that would cause the image to be overexposed without the filter.

Thus, for example, on a beach during a bright sunny day, light reflecting off the sand and the water may overwhelm the camera's built-in light meter, which may either warn the photographer against taking the shot or lock the camera's shutter, preventing the shot from being taken, says Harry Hofmann, a technical support representative at Tiffen. The ND filter reduces the brightness from the reflected light, enabling the shot to be taken.

Also, as a result of the reduced brightness, an ND filter lets the photographer open the camera's aperture wider, narrowing the **depth of field** (the area of the image that is in focus) in the image.

Hofmann says ND filters are available in three versions, which change the exposure by one, two, or three f-stops, respectively.

A polarizing filter absorbs glare and can intensify colors. The picture on the left was taken without a filter, whereas the picture on the right, with a much bluer sky, was taken with a polarizing filter.

Polarizing Filter

To eliminate glare in an image and to enhance color and contrast, use a polarizing filter, also known as a polarizer. A polarizer absorbs the light from glare and, in so doing, boosts the saturation of an object's color. Thus, with a polarizer, a blue sky in an image may appear darker.

The extent of the polarizer's effect will vary, however, in proportion to the light source's location in relation to the filter, Clemens notes. The original color saturation of the object matters, too. Lighter sections of blue sky will remain lighter than darker blue sections of sky even after polarization.

A polarizer also is useful for reducing reflections off glass or water or perhaps shooting through water, says Grotta. It is not intended to be used at night or with a flash because it requires the

aperture setting to be advanced by 1.5 or two f-stops.

Graduated Color Filter

Another type of filter that can enhance the color of a blue sky is a graduated color filter. This filter contains a color that gradually decreases in shade to clear, from the top to the bottom, or vice versa. If the top color is blue, the effect may be a uniformly deep blue sky at the top of the image and no change at the bottom. If the bottom color is green, the effect may be a richer looking lawn in the foreground of the image.

A variant of the graduated color filter is a color spot filter, which contains a clear circle in the center and color that softens gradually from the edges inward.

Special-Effect Filters

While UV, ND, and polarizing filters are the most common types—and the best to use with a digital camera or camcorder because they work seamlessly with the device's built-in light meter—there are others that many professional photographers also find useful: special-effect filters.

One type of special-effect filter is a diffusion filter, which softens the focus of the image by diffusing the light through a mesh-like surface. When used with a video camera, the filter will make the video resemble a movie, says Hofmann. But it is better to use a lower-grade filter with a video camera, Hofmann says, so that the image does not become too soft and surreal, something you would not expect from an ordinary video. Conversely, with a digital photo camera, Hofmann says, the higher the resolution (the megapixels number), the stronger the filter must be to create the same effect in the image as a lower-grade filter in a lower-resolution digital camera.

A second type of special-effect filter is a fog filter. As the name implies, these create the effect of fog in the image. Lower grades of fog filters reduce sharpness or contrast in the image. Higher grades make images extremely fuzzy.

A special-effects filter can bring out the stars in your digital photos.

A third type of special-effect filter is a star filter, which is a diffraction filter. It diffracts light from a source, such as a candle, into points of light that shoot out from the source in different directions to form a star shape. Star filters are available in versions that produce four-, six-, eight-, or 12-pointed stars. Shutterbugs should hesitate to use an eight- or 12-point star filter because, according to Tiffen, "the many star lines will tend to overpower the rest of the image." Star filters are available that offer either symmetrical or asymmetrical arrangements.

Photographers Know

It is important to note that some adjustments don't require filters at all. For example, digital cameras and camcorders offer something called a white balance setting that can be adjusted by the user to adapt the camera to different types and sources of light, such as a tungsten or incandescent light bulb, a fluorescent light bulb, a cloudy day, or a sunny day. Proper setting of the device's white balance will correct the colors in the image without a filter.

Yet, to be sure, the white balance feature is not a panacea that should make you ignore the benefits of filters.

The best photographers are more than creative. They understand the properties of light and how to capture it with a photo camera or a video camera, and filters are indispensable tools of their trade. CE

BY ROBERT E. CALEM

Find The Right Filter

Filters serve a variety of purposes, and you can even combine filters as long as you don't get carried away. Here are some of the more common filters and the effects they create.

Filter Type	Effect
UV/Protective	Prevents white objects from taking on bluish hue
Neutral Density	Reduces brightness from reflective objects
Polarizing	Eliminates glare; enhances color and contrast
Graduated Color	Enhances color in some parts of an image
Diffusion	Softens the focus of the image
Star	Diffracts light from a source point in the image to form a star shape
Fog	Reduces sharpness or contrast in the image to create a fog effect

Skype Has Your Number

Make Free Calls With Your PC

The demand for P2P (peer-to-peer) VoIP (Voice over Internet Protocol) is soaring. Credit much of the early success to Skype (www.skype.com). With 5.5 million users and a free basic service, Skype is forcing its big-name competitors in the telephone industry to take notice.

The idea is simple: Offer consumers a streamlined Internet voice application that acts like IM (instant messaging), complete with a buddy list and a familiar interface. Add encrypted calls and better sound quality than its rivals, and you have a compelling reason to make calls with Skype and save money on your phone bills—all this despite the fact that Skype users can't yet call landline phones.

How It Works

Skype is the result of several proven ideas combined. It's the brainchild of Niklas Zennström, CEO and co-founder of Skype, and Janus Friis. Zennström and Friis also co-founded Kazaa, the wildly successful file-sharing program. Skype uses a similar technology but applies it to voice chat. There are no central servers; PCs actually help route calls to one another other, assuring reliable delivery by leveraging all of the available resources in the P2P network. A **P2P network** is when computers are connected to each other (in this case, over the Internet) without any kind of hierarchical structure.

The basic service allows unlimited worldwide calling between Skype users, similar to the "in-network free calls" commonly found in wireless cell phone plans. Unlike a cell phone, though, you get an on-screen buddy list that lets you call anyone instantly. More importantly, there is no subscription or monthly fee; Skype calls really do cost nothing.

IM applications have offered voice chat capability for years. However, they are notorious for poor sound quality, dropped calls, and unsecured transmissions. Skype fixes the security problem by encrypting calls end-to-end with a 256-bit AES (Advanced Encryption Standard), which is extremely difficult to crack. As a result of the peer-to-peer framework and advice from acoustic engineers during its creation, Skype gives you great sound quality and rarely drops calls.

Skype consumes relatively little bandwidth and CPU power, too. Three- to 16-bit-rate audio may sound low, but it's good enough for clear voice conversations. And Skype does not bog down your computer; during a call, CPU use rarely exceeds 25%. One of Skype's big achievements is the virtual elimination of latency among broadband users, re-creating the feel of a regular conversation when talking to another person. Dial-up subscribers, however, will still suffer some latency because they have less bandwidth available. The Skype application supports IM for those times when using text is more convenient, and Skype recently added My Picture, which lets you use IM-style buddy icons that pop up when you're chatting with your friends.

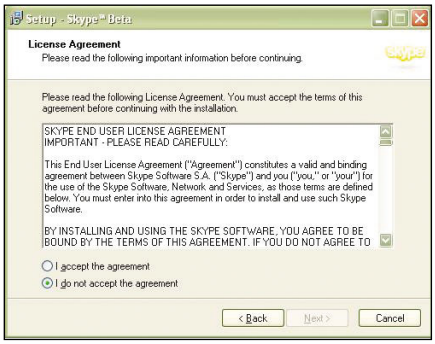
Analysts Perspectives

Skype's early market penetration is difficult to ignore. "PC-to-PC phone calling has been around a long time," says Daryl Schoolar, an analyst for technology research firm Instat/MDR. "That in and of itself isn't all that radical. What is interesting is this installed base of 5.5 million users to market to. If Skype continues to grow like IM, the peer-to-peer market could notably penetrate the long-distance market."

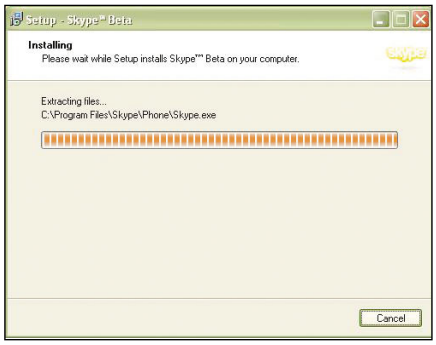
Not all analysts are convinced, however, that Skype's long-term strategy is sound. "Skype is an innovative company using a disruptive technology," says Jeff Kagan, a telecom industry

Download the latest version of Skype from the company's Web site at www.skype.com.

Installing Skype Beta on your computer is a simple process.



Click I Accept The Agreement to continue the installation.



The setup application will then install the necessary files to your computer.

Installation is complete, and you're ready to roll.

Click "I Would Like To Create A New Skype Account" and click Next to continue.

analyst. "It is a small company with a big idea. P2P VoIP will find its niche, but I don't think it will ever become the dominant choice for voice. We are moving into a bundled world where customers will probably get phone service for free along with bundles of Internet, wireless, video, security, and other services."

"The consumer communications market is becoming a quilt with patches here and there that make up the entire garment," says Schoolar. "You wouldn't totally give up all of your traditional long-distance minutes, but you could reduce them by putting them on some kind of P2P voice service."

"Skype will be very popular among a relatively small percentage of customers," says Kagan. "There are going to be 100 ways to skin the VoIP cat and thousands of companies to choose among."

Get Equipped

If you want to use Skype, the single most important investment to make is in a headset. "Soft phones that plug into laptops will be increasingly popular both as a standalone phone service and for integrating with your home or office service through the broadband connection," says Kagan. "It's like having an extension to your home or office phone when you travel."

On the low end, you can find headsets for $10 to $15 in just about any consumer-electronics store. You need one with two plugs on the end: one plug for the microphone and one for the headphones. This is because you need to plug into each separate port on your sound card; otherwise a regular headset would work. Skype has partnered with Plantronics, a communications headset company. For a basic model, try the .Audio 20 ($19.95; www.plantronics.com), which features a built-in microphone with a noise-canceling feature. Plantronics also has several higher-end models with stereo sound, behind-the-head designs, and inline controls, which are popular with gamers, as well as with folks making ordinary voice calls.

If you want to get fancy, buy a newer USB model, such as the Skype CyberPhoneK ($59.99; www.skype.com). The CyperPhoneK looks like a regular landline phone. Among other goodies, it features a numeric keypad, speed dialing, and an integrated ringer, and you can listen to music through your computer speakers while using the phone.

Using a headset is an easy way to get the most out of Skype. It is awkward to make calls using a separate microphone and speakers plugged in to your soundcard. Each time you make a call, you have to lean close to the microphone to speak, and the other party's comments would be broadcast into the room through the speakers. Plugging in a headset solves these problems and helps to establish Skype as a viable alternative to landlines or wireless phones. "It's important for Skype to pull the conversation away from the PC as much as possible," says Schoolar.

Premium Features

As of this writing, Skype was still a beta application. All of the current features are free along with the basic voice calls. The company plans to offer version 1.0, which will also be free, by the end of the summer. Skype will eventually offer a premium version that'll bundle additional features; pricing wasn't available at press time.

Beginning with version 0.96.0.51, Skype lets you make conference calls with up to four people. In the beta version, the conference-call feature is free, but a more flexible and powerful feature for business conferencing will likely be bundled with the premium edition.

The single most talked-about feature on the horizon for Skype is the ability to call regular phone numbers. Zennström told attendees at the recent VON Europe 2004 event that Skype will offer a prepaid service called SkypeOut, which will let Skype users call landlines and cell phones at competitive rates. SkypeIn, the companion feature that allows the reverse, faces considerable technical hurdles, but the two features combined could open up the market for Skype considerably.

Where Skype's Headed

The company is tight-lipped about its plans. Several Internet forums are abuzz with speculation, clamoring for

useful add-ons, such as voicemail, business conferencing, and above all, the aforementioned ability to dial landline and cell phone numbers. The two features combined, SkypeIn and SkypeOut, will definitely make the service more attractive to users who hope to replace their landlines.

Skype may also break into the airline market soon. Connexion by Boeing, a mobile information service provider, is currently investigating several possible systems for allowing voice calls from mobile phones over a Wi-Fi network while in flight. An application such as Skype could bypass this completely, letting airlines concentrate on supplying the wireless network only, without having to develop and maintain a separate system for voice calls.

Although cheaper than landlines and cell phones at the moment, Skype is still linked to desktop and notebook PCs, so it's not as flexible as carrying a cordless or mobile phone. As it stands, Skype offers a simple way to save money on your phone bills, as long as you don't mind sitting by the computer to make calls. Other VoIP services already let you call landlines and cell phones, but they require a $30 or $35 per month subscription. Basic calls with Skype are free, it's easy to set up, and calls are clear and reliable. In the end, that alone is enough to recommend giving Skype a try. CE

BY JAMIE LENDINO

How To Install Skype

Installing Skype on your computer is simple. Your PC needs to be running Windows 2000 or Windows XP, and you need at least a 400MHz processor, 10MB of free hard drive space, and 128MB of RAM. Most PCs these days have a sound card already built-in, and although a standard computer microphone and powered speakers will work, we recommend using a headset to get the most out of Skype. Finally, you'll need a decent dial-up or broadband connection.

Head over to Skype's Web site and download the latest version (0.98 at press time) to your Desktop (or to another folder). Once the setup file is downloaded to your computer, double-click its icon to begin the installation process.

Skype will ask you to choose a language from the list. Currently Skype supports more than 12 languages. After choosing the appropriate language, click I Accept The License Agreement in the next window and click Next to continue. At this point, Skype will copy the necessary files to your computer, and it should take only a few moments. Once the process is complete, click Finish to launch Skype.

Your Account & Profile

Once installed, you can create a Skype Account. This account is similar to the kind you create when you use IM. First, double-click the Skype application if it isn't already launched. Skype will prompt you to create an account and choose a password when you first load the application.

Next, you may update your Personal Profile. This information is useful for when other people browse the Skype directory and want to learn more about you, but filling out a Personal Profile is optional. Skype doesn't store the information itself, but the info's visible to Skype users who are online. Once you enter whatever information you deem appropriate, click Update to proceed to the main Skype interface.

Set Up Contacts

When you first arrive at the Skype interface, you won't have any contacts in your list. To add some, click the Search toolbar button, which lets you search for friends by name or by other information in their profiles. To add a name to your profile, right-click the appropriate name in the Search list and select Add To Contacts. The name will then appear in your contact list. If that person is online, his Skype name will appear in the main window under the Start tab. Continue searching and adding additional names to your contact list as desired.

Make A Call

There are three ways to make a call. You can double-click the name in your contact list, right-click a name (even in the search window) and select Call, or select any name and click the Call button at the bottom of the window. If someone calls you, you'll hear the sound of a telephone ringing. You can select whether to accept or reject the call from the main Skype window. An icon appears in the Taskbar when Skype is running, so click that first to maximize the application.

Double-click a contact's name, and, if the call goes through and if your contact is online, he'll answer, and you can talk. Once you have a call initialized, off you go; it's that easy. When you're finished talking, click the Hang-Up button.

If you don't hear anything or if the sound quality on either end is muddy, try using a headset. If you don't have a headset, try an inexpensive computer microphone rather than the one built into most notebooks. In addition, you may need to move the microphone closer to or farther from your mouth. You can also use headphones. It's a good idea to use headphones instead of your computer's speakers anyway. Otherwise, you'll broadcast your conversation over the speakers to anyone within hearing distance, and your speakers may cause feedback over your microphone.

Most sound cards sold in the past few years will easily handle this application. If you experience glitchy audio, it might help to head to your sound card manufacturer's Web site and update your drivers to the latest version. Make sure you download the correct drivers for your OS, which should be Win2000/XP in order to support Skype. ■

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Keep Your Home Connected

The Basics Of Setting Up, Maintaining & Troubleshooting A Home Network

Home networks are all about convenience. They let users connect their computers together, share files and Internet access, and add extra functionality to network-ready devices such as TiVos and Xboxes. Once a network is set up, it needs very little maintenance to function properly, and adding new devices and computers is relatively easy. But getting to that point isn't necessarily easy. There's a reason big companies have entire departments devoted to installing, maintaining, and troubleshooting network problems, and while this networking solution guide doesn't come close to covering every problem network users face, it can help answer the most common questions.

Problem: ***I want to set up a home network but have no idea what type of equipment I need to get started.***

Solution: Buy a router, NICs (network interface cards), and some Ethernet cable.

Routers serve as the nerve center of a network, directing all traffic that passes through it. Some routers come with additional features, such as firewalls or wireless networking capabilities (discussed later), so be sure to take the specifications into consideration when comparing prices.

NICs for a wired network generally are installed in PCI (Peripheral Component Interconnect) slots, but external models that use USB connections also are available, and most NICs designed for notebook computers use a PC Card interface. NICs connect to the router via CAT 5 Ethernet cables, and that type of cable (or a USB cable) also is used to connect a broadband modem to the router.

When purchasing hardware, it's best to get components that all come from the same manufacturer and that support the same speeds and features. The cheapest and most common wired networking hardware operates at a 100Mbps (megabits per second) maximum data transfer rate, but more expensive Gigabit Ethernet hardware is beginning to appear that operates at 1,000Mbps.

Problem: ***Ethernet cable is unsightly if I don't run it inside the walls of my house, so what do I need to go wireless?***

Solution: Buy wireless versions of the same products you'd use to create a wired network. Wireless networking technology is faster, cheaper, and easier to configure than ever, and you can install the equipment nearly anywhere. You'll need a wireless router, which today use either 802.11b (Wi-Fi), 802.11g, or 802.11a technology. 802.11b is the slowest of the three (11Mbps) but also the cheapest by far. It is more than adequate for sharing broadband Internet connections across a network, but we recommend purchasing 802.11g equipment, which operates at 54Mbps or higher speeds (depending on speed-enhancing technology that is installed) yet is also backward compatible with 802.11b hardware for greater compatibility. 802.11a hardware is as fast as 802.11g equipment but operates at a higher frequency, so it has a shorter range and is not backward compatible with 802.11b. If you insist on using a wired network, you can run a cable conduit along the walls of your home and tuck the cables inside, but ultimately it's probably easier to set up a wireless network.

Problem: ***I need to change router settings but can't find them.***

Solution: Enter the magic number into your Web browser. Most routers have integrated software that is accessible using any Web browser. Launch the browser of your choice and type **192.168.0.1** in the Address bar. That is the default address for most routers and brings up a Web-based interface containing all of the routers settings.

Problem: ***The network doesn't work at all or doesn't work between certain connected PCs.***

Solution: Check the hardware. Most network problems stem from improper software and hardware settings, but occasionally hardware failures are responsible. If a shared Internet connection seems to be down, try to watch a cable television channel if you have a cable modem or use the phone if you have DSL (Digital Subscriber Line) to see if the entire service is down. If it is, contact your ISP to see if there is a problem in your area. Check all cable connections and consider replacing Ethernet cables if the problem seems to be confined to a particular computer or device. We've experienced several Ethernet cable failures in the past few years that strike for seemingly no reason, which we easily fixed by installing a new cable.

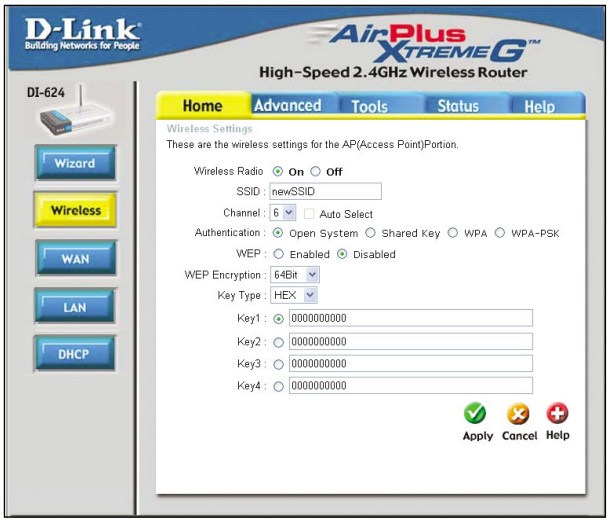
Problem: ***Computers on my network can't "see" one another.***

Solution: Change the workgroup names so they all match. When you set up a home network, it is best to assign the same workgroup name to all computers so they are all accessible from the same place in My Network Places or Network Neighborhood. To change the workgroup name in Windows XP, click Start, right-click My Computer, click Properties, select the Computer Name tab, click the Change button, and enter the workgroup name you want to use. In Windows 98/Me, right-click Network Neighborhood, click Properties, select the Identification tab, and enter the workgroup name. The computer must be rebooted before it can join the newly selected workgroup.

Problem: ***OK, my wireless network is up, but my neighbor keeps bragging about how he's leeching off of my bandwidth. Any suggestions?***

Solution: Enable WEP (Wired Equivalent Privacy) and/or WPA (Wi-Fi Protected Access). Wireless routers create a cloud of network coverage that penetrates walls, and anyone within that cloud can access your network unless WEP and/or WPA are enabled. WEP encrypts data that is transmitted wirelessly so that only other products that know the proper decryption key can unscramble and use the data. Most routers have

Wireless routers also come with Ethernet jacks for establishing wired connections and interfacing with a broadband modem.



Setting the SSID (Service Set Identifier) and enabling WEP are two important steps in properly configuring a router.

64-bit or 128-bit WEP, and you should always use 128-bit assuming all of your wireless hardware supports that standard. You'll need to configure all of your other wireless devices so that they know WEP is enabled on the router. You'll need to consult the product manuals for that information because the procedure varies from product to product.

WPA is a newer, more powerful encryption standard that is only supported by the latest routers. Microsoft has a patch available for WinXP users so they can enable WPA on their computers, routers, and NICs, but users of older operating systems must rely on third-party products such as Meetinghouse Data Communications' AEGIS Client ($39.99; www.mtghouse.com). If you have WinXP, visit support.microsoft.com, search for Knowledge Base Article 826942 ("Wireless Update Rollup Package For Windows XP Is Available"), and follow the instructions there to download and install the patch. Visit the manufacturer's Web site for your network hardware or consult the documentation to see how to enable and configure WPA on your particular combination of hardware once the patch is installed.

***Problem:* My Internet connection worked great until I connected a router to my broadband modem. Now Web pages are not appearing, and the network is not accessible.**

Solution: Double-check the cable connections and run your router's configuration wizard if it has one. Routers have several Ethernet cable jacks on the back, and if you accidentally connect the broadband modem or a computer to the wrong one, the Internet connection and network become inaccessible. Connect the broadband modem directly to the port labeled WLAN and connect other devices to the ports labeled with numbers. If that still doesn't work, access the router's internal settings by typing **192.168.0.1** into your Web browser's Address bar and see if a setup wizard is available. Run the wizard, and it will automatically configure your Web browser, router, and other settings to make them work together. If no wizard is available, you'll need to contact your ISP and manually enter any router settings they provide.

***Problem:* I want to use a router, but my ISP requires that I use a specific MAC (Media Access Control) address or the MAC address of my NIC.**

Solution: Manually enter the required MAC address or clone the NIC's MAC address.

ISPs record the MAC addresses of the modems registered for operation with their Internet service and also may identify users by the MAC addresses hard-coded into the NICs installed on the users' computers. If your ISP has these requirements, access your router's settings by typing **192.168.0.1** into your Web browser's Address bar, look for the WAN (wide-area network) settings, and manually enter the required MAC address. Most routers also have a Clone MAC Address button or link that copies the MAC address from an installed NIC to the router so that the ISP "sees" the MAC address associated with your account.

***Problem:* When I access the router's settings, it asks for a login name and password, but I haven't established those yet.**

Solution: Enter the default login name and password for your device or no password.

Configuring routers is a bit scary for beginners because generally a password screen pops up and they assume they can't get into the advanced settings. Don't fret because usually it is possible to enter a default login and password and then change those settings once you're in. For Linksys or D-Link routers, try typing **admin** in the Login and Password fields. If you have a Netgear product, try typing **admin** in the Login field and **password** in the Password field. If those don't work, enter **admin** in the Login field and leave the Password field blank.

***Problem:* I want to test my network to see if it operates at its advertised speed.**

Solution: Learn to convert between megabits per second and megabytes per second and time how long it takes to transfer files of a known size. If your network connections seem to run slowly, you can run a simple transfer rate test to help with further troubleshooting. Because files sizes are generally measured in megabytes and network speeds are generally listed in megabits, remember to divide megabits by eight to get the equivalent in megabytes. For example, a 10Mbps wireless network can transfer a maximum of 1.25MBps, while a 100Mbps network can transfer a maximum of 12.5MBps.

Copy a large file (right-click a file and click Properties to see its size in megabytes) between two computers on the

network and measure the amount of time it takes in seconds to measure the network's speed; then, do the simple math required to convert the result into megabits per second. For example, if it takes 10 seconds to transfer a 100MB file across the network, that's a speed of 10MBps, which is multiplied by eight to determine that the average transfer rate is 80Mbps. Note that no network ever operates at its theoretical maximum speed.

***Problem:** My 10/100 Base-T Ethernet NIC isn't running as fast as it should when transferring files.*

Solution: Force the card to use its highest rated speed. If you know all of the hardware in the data transfer chain operates at 100Mbps and the NIC still transfers data at an average rate of 10Mbps or less, the most likely cause of the slowdown is that Windows is telling the card to operate at 10Mbps speed instead of its maximum 100Mbps speed. To force it to use 100Mbps mode in WinXP, click Start, right-click My Computer, click Properties, select the Hardware tab, and click Device Manager. In WinMe or Win98, right-click My Computer, click Properties, and select the Device Manager tab. Find the Network Adapters entry in the hardware list and click the plus sign (+) to expand it. Then, right-click the icon for the problematic NIC, click Properties, and select the Advanced tab. Click Link Speed & Duplex in the Property dialog box and then expand the Value drop-down menu and select 100/Mbps Full Duplex. Click OK, reboot the computer, and retest the card to see if it transfers data at a speed closer to 100Mbps.

***Problem:** I use WinXP and WinMe (or Win98) on the same network, but the WinXP computer does not show up in Network Neighborhood on the WinMe or Win98 machines.*

Solution: Establish a password on the WinXP machine. WinXP has many more security features than previous versions of Windows, and although it is possible to log on to a WinXP machine without using a password, it generally is not possible to browse a WinXP computer's drives or folders via the network unless you establish a password on the WinXP computer. To do this click Start, click Control Panel, double-click User Accounts, click the name of an account with Administrator privileges, and click Create A Password. Fill in the boxes according to the instructions and click Create Password, and WinXP should become visible in My Network Places on the other computers after a reboot.

***Problem:** I need to establish a static IP address for a computer but don't know where to access the setting.*

Solution: Open Network Properties. All network devices, from computers and printers to routers and NICs, are assigned unique IP (Internet Protocol) addresses that identify them. While most cable modem and dial-up accounts assign IP addresses to customers dynamically, most DSL providers provide a static IP address that never changes as long as the user maintains their account. To manually enter an IP address in WinXP, click Start, click Control Panel, double-click Network Connections, right-click the icon of the Internet connection, and click Properties. Click Internet Protocol (TCP/IP), click Properties, and select the Use The Following IP Address radio button. Enter the IP address supplied by your ISP and click OK.

In Win98/Me, right-click My Network Places, click Properties, click the TCP/IP entry associated with your NIC, and click Properties. Select the IP Address tab, select the Specify An IP Address radio button, and manually enter the IP address assigned by your ISP.

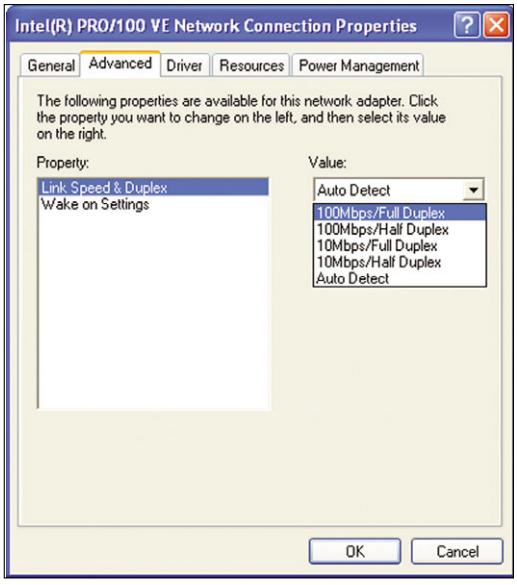
***Problem:** I have WinXP and heard it has a built-in firewall, but I don't know how to enable or configure it.*

Solution: Open Local Area Connection Properties. **Firewalls** are software or hardware designed to monitor an Internet connection to make sure all data going out and coming in is transferred at the request of the person using the computer. The firewall blocks all data that attempts to leave or enter without permission and alerts the user that something suspicious is happening. WinXP comes with an integrated firewall that is accessible by clicking Start, clicking Control Panel, double-clicking Network Connections, right-clicking Local Area Connection (or the icon that corresponds with your computer's network connection), and clicking Properties. Select the Advanced tab and click the Protect My Computer And Network By Limiting Or Preventing Access To This Computer From The Internet checkbox. Click OK, and basic firewall protection is enabled on the computer.

If you want a firewall that has better documentation, is more customizable, and that is arguably more secure than the one that comes with WinXP (or if you use an operating system other than WinXP), we recommend downloading the free version of Zone Labs' ZoneAlarm (www.zonelabs.com).

***Problem:** I've purchased a network-ready device that I want to connect wirelessly to my network, but it doesn't work with a wireless NIC.*

Solution: Buy a bridge. NICs require driver software to work with operating systems, and not all devices have built-in



If a wired NIC runs slowly, try forcing it to use 100Mbps/Full Duplex mode.

NIC drivers or the capability to let users install NIC drivers (Microsoft's Xbox is one such device). In these cases a wireless bridge is required. These devices look like routers but don't require any drivers. Typically users configure the bridge using their computer and then attach it directly to a network-enabled device where the bridge basically operates like a wireless Ethernet cable.

Problem: ***My wireless network works properly, but one or more of the devices installed on it that are located relatively far away from the wireless router receive weak or no signals.***

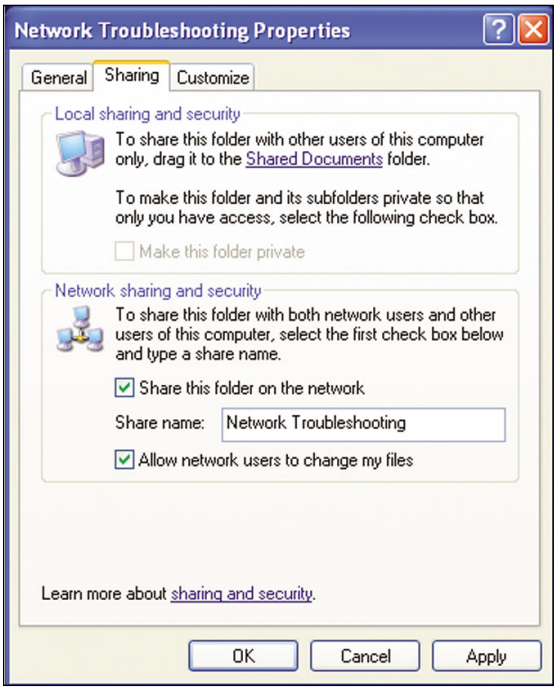
Solution: Relocate the router or consider buying a wireless repeater. Wireless signals are subject to all manner of signal blockage and interference and, therefore, rarely operate at anything approaching their maximum advertised range. If a device receives a weak signal, try moving the router closer to it or the device closer to the router. If you have a multistory house, put the router in the middle level and also try adjusting the router's antenna to see if that improves the signal strength. If none of that works, buy a wireless repeater and place it somewhere within the router's range. The repeater boosts the original signal to extend the signal's range.

Problem: ***I want to share resources on a computer throughout the entire network.***

Solution: Enable file and printer sharing. To make files and printers on a WinMe or Win98 computer accessible across an entire network, click Start, expand Settings, click Control Panel, click Network, and click the File And Print Sharing button. Click the checkboxes next to I Want To Be Able To Give Others Access To My Files and I Want To Be Able To Give Others Access To My Printers. These options are enabled by default on a WinXP computer.

Once sharing is enabled, right-click the folder or drive's icon, click Properties, and select the Sharing tab. In Win98/Me, click Share As, enter a name, and select Read-Only if you don't want other network users to be able to modify files in the shared folder or drive or select Full if you want to give them complete access.

In WinXP click the Share This Folder On The Network checkbox and type a name in the Share Name box. If you want to let others on the network edit files that are stored in the shared folder or drive, click the Allow Network Users To Change My Files checkbox before clicking Apply.



Windows lets network users share individual folders or even entire drives among several PCs in a home network.

Problem: ***I can download and transfer files among networked computers relatively quickly, but Web pages seem to load slowly regardless of the computer I use to browse the Internet.***

Solution: Check for high latency. All network connections suffer from **latency**, a measure of the amount of time in milliseconds between a request being made and that request being carried out. But Internet connections have more latency issues than network connections because requests must bounce from server to server to reach their destination. If there is a slight delay between the time you click a Web link and the time the first portions of the requested Web page begin to render in your browser, that's latency. Long delays that happen randomly or only at particular Web sites generally are server problems that are not related to the latency inherent with your Internet connection.

To measure latency accurately, click Start, click Run, type **cmd** in the text box, and click OK. When the prompt appears, type **ping www.yahoo.com** and press ENTER. Repeat the command several times, replacing www.yahoo.com with the URLs for various Web sites, noting the average latency value each time. If the Average value is consistently in the triple or quadruple digit range for every site you ping, you have relatively high latency and should consider switching to a different ISP.

Don't Forget The Drivers

We've mentioned **drivers** (the software that lets hardware communicate with an operating system) in this article, and it is important that you check the manufacturer Web sites for your networking hardware to make sure you have the most up-to-date drivers for your devices. New drivers may add features or functionality to your network gear and can solve compatibility problems. Drivers are always available for free.

Also, check for new firmware for your router. Firmware serves as the router's operating system, and upgrading it can make the router work more efficiently, add new features, and resolve compatibility issues. Follow the firmware installation directions carefully because botching the upgrade or installing the wrong firmware version can make the router useless, and never upgrade firmware via a wireless connection. Keeping your hardware up-to-date is worth the risks, however, as doing so keeps your network running smoothly. CE

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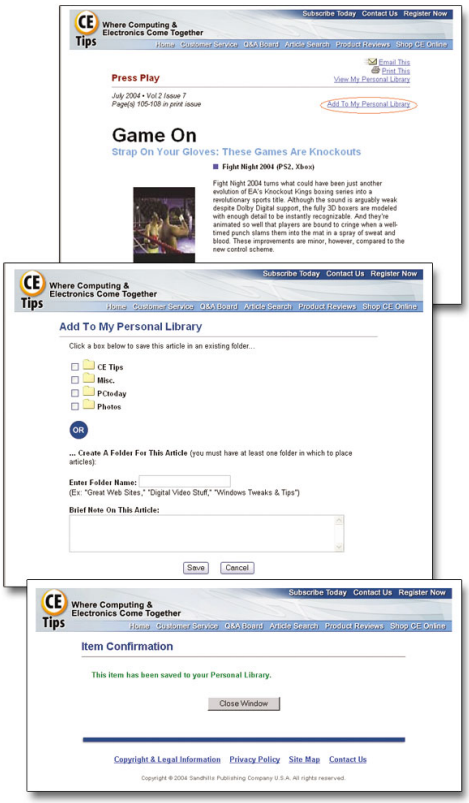

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Pocket Arcades

Next-Gen Handheld Gaming

The original 32-bit Sony PlayStation's origins lie in a joint venture between Sony and Nintendo; Sony was to provide Nintendo with a CD-ROM for the gaming giant's hardware platform. Nintendo, the story goes, backed out of the deal, and in a fit of pride, Sony resolved to enter the console game business. Few people would have predicted that Sony—even with its tremendous brand recognition—would have made such an impact in an industry dominated by Nintendo and Sega. PlayStation relegated Nintendo to runner-up and drove Sega out of the console market. While Sony's unheralded success must have emboldened Microsoft, Redmond has since learned what it's like to take on the market leader; the Xbox is a distant second and losing money on each unit sold.

But Nintendo has had a console market to itself: the handheld market. Its Game Boy and Game Boy Advance SP own a huge market share in handheld games. Nokia's abortive attempt to enter this market with its first generation N-Gage was seen as water breaking on Nintendo's impenetrable sea wall. But Nokia has the money to try again. And Sony is bringing its PlayStation brand to mobile gaming.

During the 2004 E3 (Electronic Entertainment Expo), Nokia, Sony, and Nintendo unveiled their handheld gaming entries. And unlike prior pretenders, such as the NeoGeo Pocket and Atari Lynx, Sony and Nokia could prove to be formidable, if not dominant players, in this market. But Nintendo, with huge mindshare, cash reserves, and creative talent and chastened by Sony's success, is positioned to make a better stand here than it did in the face of the original PlayStation.

What is clear is that the next generation of handheld hardware moves mobile game production values from 2D sprites and games you play to pass the time on the subway to the kind of environments we've come to expect on this last generation of consoles—potentially epic, involving, and immersive experiences, all on the go.

PSP

The PSP, or PlayStation Portable, follows the latest trend at Sony with convergence; the PSX, released in Japan, is a PlayStation 2 and TiVo-like DVR (digital video recorder) device, designed to be a hub of all home entertainment, not just video games.

The PSP will not only play games, but it'll also play music and movies—in theory, anyway.

Although mock-ups and game screen shots were shown at E3, no working units or software running on actual systems were available for attendees to play—strange considering the PSP is slated to debut in Japan at year's end and in the United States in early 2005. Sony says the first demo-able games will be available at the Tokyo Game Show in September.

The sleek industrial design echoes the still-stylish PS2 aesthetics, and the 16:9 widescreen TFT (thin film transistor) LCD displays 16 million colors at a 480 x 272 resolution. The PSP will also reportedly include support for Memory Stick PRO Duo memory cards, USB 2.0 connectivity, and 802.11b wireless networking and will use Sony's new 1.8GB UMDs (Universal Media Discs) as its primary storage media. Sony claims that a broad range of media will be supported, from games "rich with full-motion video" to music, film, and video. No surprise, given Sony's music and film libraries, that the PSP will be designed with "a robust copyright protection system." Battery life is estimated at two to 10 hours, and Sony has already shown an external battery pack as an optional accessory. It's likely that the two-hour mark represents video playback with a constantly spinning optical disc, and the

10-hour mark is a theoretical maximum (for instance, a game that only accesses the optical disc very sporadically). Given the relatively modest 32MB of memory, some disc access appears probable, making the 10-hour battery life figure likely as reliable as EPA gas mileage ratings on your car.

The PSP looks to be a multifunction device, and therein lies the potential rub. PSP could have been a GBA *and* iPod killer, but it seems highly unlikely that Sony will adopt the relatively painless and liberal iPod model, which allows users to simply move their MP3s from their computers to iPods. Although Sony's various CLIE PDAs allow similar straightforward MP3 playback, its Network Walkmans have used clunky DRM (digital rights management) software to manage music files checked in on a PC and moved to a Sony device. And will users be forced to buy PSP versions of their DVDs? This seems likely given the fact that the PSP movies might be region-coded like DVDs and console game platforms; although games will not be region-locked, Sony is no stranger to proprietary formats that have achieved limited success at best. Memory Stick is fairly popular (with all of Sony's various digital cameras, PDAs, and other devices), but Betamax and MiniDisc are footnotes to VHS and MP3 players. And Sony is promising some sort of camera and mobile phone functionality, as well.

All this multimedia functionality doesn't come free either; increased complexity usually means increased price. Sony Computer Entertainment of America's chief Kaz Hirai admits that Sony's ready to sell these units at a loss, making up revenue through software licensing fees, using the same model as the console industry. Still, iconoclastic Atari CEO Bruno Bonnell has openly questioned the pricing model. While analysts predict a $249 to $349 price point, Bonnell openly wonders if the hardware will cost $500. Even $249 is a long way from the GBA SP $100 price point.

But the main event is the games. Sony claims that the PSP will have roughly the same computing power as the PlayStation 2, and certainly, the mock-up screens of Konami's Metal Gear Acid for the PSP seem to back that up. Sony's been adamant that it will not allow mere ports of PS2 games to the PSP, the same way that Microsoft has discouraged PC game ports to the Xbox. This limits the PSP's launch library compared to the GBA-compatible DS and the N-Gage's head start on the market, unless Sony plays it loose with its definition of port. Already, Sony's Gran Turismo 4 Mobile is allegedly identical to its PS2 brother, except it uses Wi-Fi online play rather than broadband, and you can imagine a Grand Theft Auto title being given some license here, as it's a marquee title.

PSP (PlayStation Portable)

Kaz Hirai says that he'd like to have six to 10 launch titles, and publishers such as EA have committed titles in development. Still, at press time, EA says that it still doesn't have final development hardware, only emulators. Will PSP launch in 2004 as planned? Will there be enough games? Will there be community-developed tools and hacks that will let us play our own movies and music on the PSP without using Sony's obtuse software, given the PSP cannot record to its optical drive?

Code Name: Nintendo DS

Nintendo is the reigning champion of handheld games in a way Microsoft *wishes* it owned the computer Desktop. Game Boy claims between 98% and 100% of the market, according to Nintendo. It has sold 168 million Game Boys and 21 million Game Boy Advance systems. Despite the lumps taken in the market by GameCube and the Nintendo 64, the emergence of Sony and the sudden street fight with Microsoft for second place, Nintendo has been able to rely on its handhelds for market dominance and revenue. You can be sure that it's been preparing for an inevitable fight in this market, too, given Sony's handheld consumer electronics expertise.

Nintendo execs, including Shigeru Miyamoto, the famed creator of Zelda, Mario, and Donkey Kong, claim games are getting too complicated and that they want to introduce games that appeal to those who don't want to learn a 16-button/combo interface. They have focused on games vs. sheer hardware power; the GameCube doesn't double as a DVD player and is underpowered compared to the (more expensive) Xbox. This "games first" approach definitely works when you have some of the greatest game developers and franchises on your console: Pokemon, Mario, Link, Donkey Kong, Pikmin, and Resident Evil, just to name a few. GameCube is more or less tied with Xbox in global adoption. It does not hurt Nintendo that Xbox is about as welcome as bad sushi in the cradle of console-gaming Japan.

Nintendo showed off working prototypes at E3 of the handheld currently code-named the Nintendo DS: DS meaning Dual Screen, or given the prototype nature of the hardware, "developer system." Gamers got to actually play with working systems at E3, something PSP could or would not do, but Nintendo said cosmetic changes were still possible before final user hardware would be unveiled. The system's real name will be released in the future, but developers have working development kits today.

The Nintendo DS' twist is its user interface: dual screens and touch control, along with the traditional D-pad and button layout, while ceding pure computing power to the PSP. Nintendo claims that the DS is slightly more powerful than the Nintendo 64 game console, which was more powerful than the original PlayStation but a half-step behind the PlayStation 2. This might be a disadvantage; then again, some of the

Nintendo DS

greatest console games ran pretty nicely on the N64—Mario 64 and Legend of Zelda: Ocarina of Time.

The DS has a top screen for display and a second screen for a display and a touchpad-like interface. Both screens are capable of rendering full 3D images. One prototype of a Pac-Man game, Namco's Pac Pix, lets users draw their own Pac-Man on the touchscreen, which the game will animate. Players can then direct their little character by drawing barriers on the touchscreen. Yes, it looks like you'll have to worry about losing your stylus. And the DS has a microphone port, giving it the potential to use voice recognition as control in future games.

The DS prototype, which Nintendo claims to be close to final, was shown at E3. Compared to the PSP, the DS design was uninspiring, a disappointment after the elegant GBA SP. Japanese gaming magazine *Famitsu* polled its readers, and they overwhelmingly agreed that the PSP was a more pleasing design. (*Famitsu* readers thought that the DS would have better games, however.)

The DS battery life will be similar to the GBA SP—good news for Nintendo, as many speculate over the PSP's battery life. Better news to gamers is that Miyamoto seems genuinely intrigued with the gameplay possibilities that the touchscreen offers. Miyamoto's games have always focused on elegant controls that are at once simple and flexible. Miyamoto's focus on game design gives the DS a powerful weapon in the handheld war. It is, after all, about the games, not the hardware.

But the DS also faces similar problems as the PSP and GameCube. At an estimated release price of $199, it is still significantly pricier than a GBA; in fact, Nintendo is *not* positioning the DS as a GBA replacement, even though it will have backward compatibility with the GBA. It's been confirmed in the press that Nintendo is also working on a replacement for the GBA, which is definitely not the DS. This is more than confusing to analysts, developers, and consumers.

And the knock on the GameCube is that its games' content still skews toward a younger audience. Will the DS follow suit, which might be fatal given its higher price point and the PSP's "cool" factor?

Although both PSP and DS claim 100 developers working on games for their new systems, the DS is the only system that can brag that it will have 500 games at launch because of GBA's backward compatibility. Backward compatibility has proven to be a nice selling point for the PS2, even if users didn't end up playing those older PS one games. And Microsoft's been cagey about whether its next Xbox will be backward-compatible with the first Xbox. The DS will have GB/GBA cartridge slots, but its own cards will be as small as SD (Secure Digital) flash memory cards.

Nintendo loyalists and Miyamoto fans will no doubt scoop up the Nintendo DS. It seems almost a given that Nintendo will lose some market share to the PSP, but whether that's 3%, or 30%, or even more than 50%, will be determined by the PSP's final specs and the raft of games being developed for both systems.

N-Gage QD

When we saw the original N-Gage at the 2003 Game Developer's Conference with some game developers, we were puzzled. There was no way that the phone placement on the unit's edge, or the game cartridge slot inside the battery compartment and underneath the battery, was a final design. Nokia has a reputation of usability and design; the unit we saw couldn't be a final design, could it?

It was, and the N-Gage launch could only be charitably termed a complete disaster. Although Nokia claims it has sold 600,000 systems, most of those systems are probably sold into the retailer and not to the consumer; you'd be hard-pressed to find any of those buyers despite some support from established games publishers with titles such as Tomb Raider and an excellent Tony Hawk skateboarding game. But, to Nokia's credit, it's persevered, and the U.S. N-Gage QD launched in July. The new N-Gage is smaller and more ergonomic and fixes the two main complaints of "sidetalking" and poor cartridge-slot placement, but it omits the FM and MP3 playback of the original system (MP3 player is available as a download, however). You can talk on an N-Gage QD as you'd expect with a cell phone, and the MMC (MultiMediaCard) slot is accessible without removing the battery. Both the N-Gage and N-Gage QD will be available at retail.

And with the N-Gage QD's size close to the GBA SP, this is Nokia's first real game device. Battery life is estimated at 10 hours, less if you use Bluetooth. The QD should be available by the

Nokia N-Gage QD

PSP Specs:

Color: Black

Dimensions: 6.7 inches x 3 inches x 1 inch (170mm x 74mm x 23mm)

Weight: 8.3 ounces (260g), including battery

CPU: PSP 333MHz

Memory: 32MB RAM, 4MB embedded DRAM (dynamic RAM)

Display: 4.3-inch, 16:9 widescreen TFT, 480 x 272 pixels, 16.77 million colors, max 200cd/m2 brightness

I/O: 802.11b, USB 2.0, Memory Stick PRO Duo, IrDA (Infrared Data Association), IR (Infrared) remote, Read-only UMD drive, headphone jack

USB camera, GPS (global positioning system), and keyboard accessories

Optional external battery

Games To Watch For:

Metal Gear Acid

Tiger Woods Golf

Need For Speed

Gran Turismo 4

Tony Hawk Underground

Death Jr.

Nintendo DS Specs:

ARM7 and ARM9 CPUs

16-channel sound

Two 3-inch LCDs, each roughly the size of a GBA screen

802.11b and Nintendo proprietary wireless connectivity

Titles Of Note:

Super Mario 64: 4x4

Metroid Prime: Hunters

WarioWare Inc DS

Mr. Driller

Viewtiful Joe

Yu-Gi-Oh!

Sonic DS

Bomberman DS

Need For Speed

Pac-Pix

N-Gage QD Specs:

ARM9 104MHz CPU

Weight: 4.6 ounces (143g) with standard battery

Dimensions: 4.6 x 2.7 x 0.8 inches (118 x 68 x 22 mm, 123cc)

Data support GPRS (General Packet Radio Service) up to 40.2Kbps (kilobits per second) Class B, 3+1, 2+2

Bluetooth, dual-band GSM

Screen: 1.4 inches x 1.6 inches (35mm x 41mm), active matrix, 4,096 colors

3.4MB internal user memory

16MB SDRAM (synchronous dynamic RAM)

Mono headset with dual earpieces for games sounds and call control

MMC memory card support

Titles Of Note:

Pocket Kingdom: Own The World

Bomberman

The Sims: Bustin' Out

Crash Nitro Kart

Tiger Woods PGA TOUR 2004

Call Of Duty

Tom Clancy's Ghost Recon: Jungle Strike

time you read this; good news if you want some immediate gaming gratification, but there's no doubt that the yet-to-be-released PSP and the Nintendo DS will be *far* more powerful systems. The QD runs at the same speed as the original N-Gage.

The QD offers some nice gaming perks today compared to the GBA; because it's a phone, the N-Gage Arena community allows communication, uploadable high score lists, and downloadable game content. Bluetooth support for multiplayer play shows up in Tom Clancy's Ghost Recon: Jungle Storm, where players will be able to play cooperatively or competitively. Pocket Kingdom claims to be the first mobile, massively multiplayer game. And with other notable titles coming, such as Bomberman, Pathway to Glory, The Sims Bustin' Out, Crash Nitro Kart, and Tiger Woods PGA Tour 2004 (plus existing N-Gage games), gamers will have something to play. Originally, Nokia hoped to have 100 new games by the end of 2004 but recently cut its estimate to 40 titles—evidence that publishers, perhaps, are wary of backing the N-Gage in the face of Nintendo and Sony.

As a convergence device, the N-Gage QD makes some sacrifices to be both a game device and a phone. The screen resolution is only 176 x 208, displaying 4,906 colors, but Nokia claims the QD has a better backlight than the original N-Gage. Yet given the increasing ubiquity of 16:9 aspect ratio screens, the N-Gage screen seems to be narrow, probably a necessity to fit the phone functionality on the device. And currently the phone is limited to GSM (Global System for Mobile Communications) networks: T-Mobile, AT&T, and Cingular. Sprint and Verizon users are dis-N-Gaged.

Battery life seems to be acceptable: five hours talk time, 240 hours standby, five to 10 hours of gameplay time—certainly not less than any cell phone user would expect from a cell phone. Like many modern cell phones, you have full email support and a Web browser.

There's no question that the N-Gage QD is a real handheld game device, far more powerful than any cell phone's games capability. And it stacks up nicely against the GBA, hardware-wise. It's certainly the only gaming device that doubles as a cell phone. But considering the N-Gage's original release date, its relatively limited software support and the impending DS and PSP make this a hard choice for any gamer looking for state-of-the-art technology or an established library of titles. If Nokia wants to survive, N-Gage 2 better be on the drawing board.

Also Ran

If you're looking for a multipurpose device, you might also look at the Tapwave Zodiac, a handheld device that looks suspiciously like a PSP, with a 3.8-inch widescreen aspect ratio handheld game console. The Zodiac has a respectable, if small, lineup of games (unless you include the millions of shareware Palm games out there today), computing power between the N-Gage and the DS, and a touchscreen and is a full-featured Palm OS PDA. Sadly, it will only run two hours on a charge. CE

BY BERNARD YEE

AMD

AMD 64 Athlon FX

Introducing the AMD Athlon™ 64 FX processor. Take your system to extremes.
Double the data path from 32- to 64-bit and you more than double the thrill factor. Uninterrupted, ear-splitting, streaming audio and rich, razor sharp video make your pad a launching pad. What's more, you get all the power you need to edit, mix, and model your own digital creations with memory to spare. Prepare to blow minds. Get a dose of the AMD Athlon 64 FX edge at www.amd.com/amdathlon64fx

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Canon ZR90

Canon's ZR digital camcorders use Canon's high-quality optics and include rich features and compact styling. The ZR90 (the top end of the entry-level series) offers more features than other models in its class but delivers mixed results.

The ZR90 uses a 1/6-inch CCD (charge-coupled device) to capture video and stills to either MiniDV cassette or MMC/SD (MultiMediaCard/Secure Digital) media. The ability to record either mode to either media is uncommon in this price range and is very useful for capturing and transferring short clips. The 22X optical zoom is also relatively long, and Canon's optics pull it off well. In addition, Canon throws in an accessory wide-angle lens for the ZR90, further enhancing an already competitive set of features. Add manual controls for Focus, Exposure, White Balance, and Shutter Speed, and you're pushing the boundaries of entry-level. The unit is small and attractive (3.7 inches high x 2.1 inches wide x 5.5 inches deep). Inexplicably, though, Canon didn't include an external microphone input.

It's easy to set up the ZR90. You can master the basics of recording and transferring video after just a few minutes. The menu is intuitive and concise, and the camcorder's playback controls along the left side (just above the 2.5-inch LCD) double as recording options for adjusting Focus, Night Mode, and Search tools. Along the right side, within easy finger-reach, are one-touch toggles for manual or automatic operations and media selection (tape or memory card). The camcorder's editing and effects controls are hidden underneath the LCD screen, though. The End Search option forwards to the end of the last recorded scene to help avoid recording over your precious moments. Finally, the line-in function works great for recording analog or digital video from TV, VCR, or camcorder sources.

Canon ZR90

$599
www.canonusa.com

MiniDV records at 520 horizontal lines of resolution—short of HD quality but better than standard analog and television signals. Despite the prevalence of the standard, image quality among MiniDV camcorders varies widely based on sensor size, lens quality, and proprietary processing technologies. The ZR90's 1/6-inch CCD uses Canon's DIGIC processing technology to maximize color reproduction, and color results are impressive. In bright outdoor light, colors are brilliant and accurate. However, the ZR90's image quality overall is mediocre indoors and under low-light conditions (including in Night Mode). Such limitations aren't unusual for camcorders at this price, though. Our bigger concern was with its autofocus. The autofocus has a hard time keeping up with even mildly dynamic scenes indoors or out. It often takes a full second or more for the focus to catch up to a shifting background or a moving person. The ZR90's audio quality is good. The camcorder catches very little of its own noise and picks up ambient sounds clearly, even at a distance. The camcorder's still-image quality is poor, at less than 1MP (megapixel), but not any worse than most competing models.

The ZR90 is available online for around $500, an attractive price, especially considering the strong features. Its image quality is about normal for this level of camcorder, though the autofocus problems are disappointing. Its focusing struggles prevent us from giving the ZR90 a firm recommendation. ●

BY GREGORY ANDERSON

Use The ZR90 As A Recorder

The ability to record directly from analog or digital inputs is one of the ZR90's more intriguing options. And it's simple to use. To get the most out of this feature, follow these guidelines:

Set the ZR90 to "Play (VCR)" mode on the power switch. It may be counterintuitive (you're recording, not playing), but it tells the camera not to record through the camcorder lens.

Press the REC PAUSE button (underneath the LCD). Begin playback at the external source and, when you're ready to record, press Play on the unit's left side. To stop recording, press Stop.

You can record from either analog or digital media. For analog sources, connect the yellow, red, and white A/V jacks to the ZR90's single yellow A/V input (using the included splitter cable). For digital sources, connect a cable to the FireWire ports on each machine using separately available cables.

You can even pass analog signals through the camcorder to a digital destination by connecting both (as above). The ZR90's FireWire connection will automatically output the video, so you can play the analog source, pass its output through the ZR90's FireWire port, and record on the destination digital device (PC or camcorder). ■

Sony CDX-M9905X CD/MP3 Receiver

People have always needed to roam, from our early hunter/gatherer days to the birth of the Interstate Highway System. The Interstate begat the road trip as a pleasurable pursuit rather than simply a way to get from Here to There, and an essential part of that trip was the car radio. Then came FM radio, 8-track car stereos, cassette players, and CD players.

CD players have evolved along the way, too, as many now play CD-Rs and MP3s. Sony's CDX-M9905X car receiver is a more-than-capable CD receiver, but the feature that will draw the most attention is the thin, 32,000-color, full-motion video TFT (thin film transistor) display built into the face of the player. The M9905X plays several preloaded animations and video clips, and if you're not satisfied with those, you can upload up to 100 frames of your own video to the receiver. The M9905X's video display is pure bling and may very well hypnotize your passengers.

Sony CDX-M9905X CD/MP3 Receiver

$659.99
www.sonystyle.com

The unit's audio abilities are, of course, more important than its video gimmickry, and the M9905X is well-equipped. It fires out 23.2 watts rms (root mean square) per channel and has a generous frequency response of 10Hz to 20KHz. It also plays CD-Rs and CD-RWs and supports MP3 playback (not Windows Media Audio, however). You can cycle through seven preset EQ settings to create just the right sound for your music. The M9905X also stores up to 30 radio stations and supports XM Satellite Radio (which requires a separate tuner and an XM subscription).

We were impressed with the receiver's audio quality; it belted out our music, loud and crystal clear. We did have a couple of problems, however. The recevier would sometimes spit out our CDs when we inserted them, and we'd have to reinsert them two or three times before the receiver played them. We're not very fond of the menu interface, either. You'll have to click through several screens using the remote control or the buttons on the receiver to adjust the EQ and tone controls. We'd rather adjust these on-the-fly with a couple of button clicks.

If you're looking for a showy CD receiver that'll impress your friends, you'll like the M9905X. But you can find a receiver with nearly the same audio characteristics for about half the price (such as Sony's CDX-M8805X), which seems like a better deal to us.

BY MICHAEL SWEET

E-Book FlipAlbum Recorder

The FlipAlbum Recorder is a slim, plain-Jane optical drive designed to make it easy for photo buffs to back up and share their digital images. In the box, you get a CD burning drive embedded with a stripped-down version of E-Book's FlipAlbum software, one RCA cable, one audio cable, and a remote control.

With these tools, you can insert a CF (CompactFlash) card (other card types require a $30 adapter) and copy its images to CD in one of two ways. You can simply burn the files to the disc for storage, freeing up your flash card for more picture taking, or you can burn the images in the FlipAlbum format.

If you choose the latter of the two, anyone with a CD-ROM drive can insert the CD and view your pictures in a three-dimensional album that actually lets you "flip" the pages with a mouse.

E-Book FlipAlbum Recorder

$249
www.flipalbum.com

You can do a little tweaking before you burn an album CD by using the remote for Rotate, Zoom, and other basic commands, and you can alter the album's visual background theme. In addition, you can customize the album's music with MP3 files, but only to the tune of files that are 2.5MB or smaller.

You can also use the drive to display images. When you insert a flash card or non-FlipBook CD with multiple image folders, the drive displays folder names at the top of the screen, making it easy to browse your images. If you insert a CD that someone created with FlipAlbum Suite or Pro, the device loads the customized FlipBooks correctly, but with some features disabled. For instance, you won't be able to view FlipBooks with embedded video or HTML pages—not exactly a full-featured display system, if you ask us.

In the end, the whole album creation process is tedious when performed via remote control, the drive is too expensive compared to others in its class, and you can't even connect the drive to your PC for other uses. We'd prefer to archive our images using a different method and then use a PC-based version of FlipAlbum to create our digital keepsakes.

BY NATHAN CHANDLER

Harmony H688

Harmony's original family remote, the SST-659 was so good (winning our shootout in last December's *CE Tips*) that we wondered whether Harmony could top itself. The new H688 offers improved ease of use for DVR devotees and retains all the benefits that made its predecessor our remote control of choice.

Harmony's stroke of genius was taking its setup online. Install the software, connect the remote to your PC with the included USB cable, and set up an account at the Web site. Next, tell Harmony about your system: the make and model for your TV, DVD player, DVR, A/V receiver, CD player, and so on. Then walk through the wizards to set up the remote to carry out common tasks with a single click. For example, watching a movie entails setting up certain components, such as setting the receiver to DVD, switching the TV to A/V1 input, and pressing Play. You can use the wizard to create a macro to carry out those tasks with one click. When you are done, the software programs the remote for you. No three-digit codes, no testing the Power button, and no step-by-step macros to record. Best of all, Harmony's Web site remembers your configuration, so changing your remote to control new components is a piece of cake. And, because Harmony's database is constantly updated, you'll never have to worry about the shelf life of the remote's codes. Default buttons for Watch DVD, Play Music, and Watch TV make common tasks astoundingly simple. An LCD with half a dozen customizable buttons adds extra activity options.

Harmony H688

$249
www.harmonyremote.com

The H688 has a few more buttons than its predecessor, adding DVR playback and program guide functions. We found its layout more cramped and its tactile feel less pleasing, but, for DVR users, the tradeoff is likely worthwhile. We tested the remote with lots of devices and easily found codes for most of them, and the H688 also "learns" from factory remotes.

Harmony didn't go wrong in adding DVR functions and did very well to retain the best features of its pioneering approach to remote control setup. At $250, the H688 isn't a must-have upgrade for current H659 owners, but DVR users in the market for a new universal programmable remote won't find a better option.

BY GREGORY ANDERSON

Toshiba SD-P2600 Portable DVD Player

Toshiba's SD-P2600 covers all the portable DVD player bases. It includes enough accessories to use it almost anywhere and serves up high-quality video in the process.

At 8.9 diagonal inches and with a 16:9 widescreen aspect ratio, the unit's screen is large enough to provide a good picture without sacrificing the player's portability. The progressive-scan player delivers sharp images to the device's LCD. Its contrast and color accuracy are good, though black levels aren't anything to write home about. The lack of display configuration options prevents any tweaking, but overall the picture is fine for a portable player.

The SD-P2600 has a full complement of easy-to-use controls. The on-screen menus leave a little to be desired, though, with too many options lacking any clear hierarchy. The player's battery life is good. We consistently clocked more than three hours of play from a full charge. The disc's door seems a little flimsy though; we're apprehensive about how well it will hold up under tough road conditions.

Toshiba SD-P2600 Portable DVD Player

$699.99
www.toshiba.com

The Li-Ion (lithium-ion) battery weighs about as much as the unit itself, but it doesn't add a lot of bulk in the case. Included composite and component cables (plus an S-Video jack) let you connect the SD-P2600 to any TV, an extra bonus for travelers. You can also take your music on the road; the player supports CD audio and DVD Audio, plus MP3 and WMA (Windows Media Audio) playback from CD-R/RWs. The player even reads SD (Secure Digital) and MMC (MultiMedia Card) cards and displays JPEG (Joint Photographic Expert Group) images.

The SD-P2600 has a street price around $500 and has similar playback options and screen size as other products in this price class. Its solid picture quality and flexibility push it ahead of the competition. If you're willing to sacrifice screen size and playback options, you can find a cheaper portable DVD player. But if you want a good picture, this player is a solid buy.

BY GREGORY ANDERSON

Universal Remote Control URC-300 Customizer

Universal Remote Control URC-300 Customizer

$200

www.universalremote.com

Finding a universal remote control that can accommodate all of your home electronics is challenging. Not because managing your components is a challenge—that's the easy part. The difficulty comes in selecting a universal remote from the plethora of devices on the market. With its unique blend of ergonomics and programming flexibility, the URC-300 Customizer deserves a place on your coffee table.

The URC-300 is designed around a small touchscreen LCD that provides navigation menus in a compact design. This gives the URC-300 multiple device "buttons" without sacrificing real estate on the unit's handgrip. The majority of the physical buttons on the Customizer are traditional controls: Power, Channel Up/Down, Volume, and a numeric keypad for entering specific channels. These buttons are logically placed and easy to use. In addition, the buttons are backlit for use in the dark, and the LCD is well-lit with a sharp contrast level. This helps when viewing the screen in bright conditions.

Like many of the universal remotes on the market, the Customizer includes preprogrammed codes for hundreds of consumer electronics. We were able to find accurate codes for all four of our home theater test devices, and we found that using the preprogrammed codes were a welcome change from manually training a remote to fit our environment. Should your TV or stereo be absent from the Customizer's suite of codes, you can use its learning mode to mimic your remote.

The Customizer is also a sound choice for those home theater enthusiasts who want to program macro modes. Macros let you control multiple devices with a single button. For example, we created a DVD macro to turn on the TV, switch it to the DVD input, power on the DVD, eject the DVD tray, and switch the A/V receiver to the DVD audio setting, all with the push of a single button.

Remote controls aren't as glamorous as flat-panel TVs, but a well-designed remote can make the difference between wrestling with your home theater's components and maximizing their use. With the URC-300 Customizer, we feel you'll be spending more time watching your movies than configuring components.

BY CHRIS JACKSON

Sanyo PM-8200

Sanyo PM-8200

$279

www.sanyo.com

The competitive world of cell phones is a boon to the consumer looking for mobile communication devices. As manufacturers vie for market share, they're forced to add features and increase performance, all while keeping the phone as small as possible. The Sanyo PM-8200 is a sign of how far cell phones have come since their introduction, with features that will make you wonder what future cell phones will be capable of.

The PM-8200 is a small flip-style phone that is at home either in a pocket or on a belt clip. At less than 4 ounces, the PM-8200 is easy to carry. It's also easy to use.

The outside of the phone features a prominent speaker phone that delivers the best performance we've heard from a cell phone. The PM-8200 also features a small external color display that users can use for Picture Caller ID. It also displays the time, signal strength, and battery life. Finally, the PM-8200 includes a VGA-quality camera with built-in flash. With only 310,000 pixels, the PM-8200 won't replace a good digital camera, but for quick snapshots, it did an acceptable job.

One of the newest features for Sanyo is support for Sprint's PCS Ready Link system. This enables the user to engage in two-way walkie-talkie style conversations with other Sprint users. Unfortunately, this is limited to users who have cell phones with Ready Link support built in.

Under the lid, the Sanyo phone includes an illuminated keyboard with recessed keys. The menu system has been revamped from previous versions of Sanyo phones and combines its better design with the ability to store more information. You can store up to 500 phone numbers, 300 email addresses, and 300 URLs.

The PM-8200 is typical of today's Swiss Army Knife-style phones, doing just about everything that is imaginable with a phone. Usually this results in a bulky, hard-to-manage device, but Sanyo (in partnership with Sprint PCS) has delivered a phone that is both powerful and easy to use.

BY CHRIS JACKSON

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WAG311
108 Mbps
Dual Band
PCI Adapter

54 Mbps 2.4 GHz 802.11g

WG602
54 Mbps
Access Point

WG511
54 Mbps
PC Card

WG311
54 Mbps
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CE Face-Off

Digital Camcorders, $500 To $1,000

It's no exaggeration to say that camcorders have changed modern culture. Their influence ranges from mundane "funniest home videos" entertainment to deadly serious matters of crime and justice.

For most of us, though, camcorders are a tool for preserving special memories and everyday life. They've come a long way from the early clunky designs of the 1980s, and their transition from analog to digital has reaped the familiar rewards of streamlined size, greater flexibility, and features galore.

Roll 'Em

The camcorder market is a crowded one, and in rustling up a quintet of test units, we had no trouble finding candidates with list prices in the $500 to $1,000 range. Each model we cover is part of an extended product line, with siblings and cousins up and/or down the price scale.

On the surface, all the units share the same general design. They're sufficiently compact for one-handed operation. Affixed to the right side of each unit is a padded, adjustable strap that will cinch around the back of your hand (sorry, lefties, you'll have to adapt). This positions your thumb near the Record button on the rear of the unit, with the Zoom slider on top, within reach of one finger.

On the left side, a large panel swings out to reveal an LCD screen. This displays the lens' view or a playback of what you've already shot; it also displays the camera's menu options and furnishes data while filming. On all models, the screen rotates 270 degrees: You can flip it 180 degrees to the front, to self-monitor while filming. (The image inverts when the LCD faces front, so it's still right side-up even though the screen is upside down.) The screen can also pivot up to 90 degrees toward the user, letting you maintain an optimal view when you need to tilt the camera down or lift it overhead. Under bright lighting conditions, when LCDs sometimes lose clarity, you can revert to the optical viewfinder.

The camcorders have several other aspects in common. Each draws power from a Li-Ion (lithium-ion) battery, which snaps onto the back of the camera and comes with a charger that will also serve as an adapter when you want to run the camera directly from a wall outlet. (All lengths below were measured with the battery attached.) A multi-position rotary switch lets you choose the camcorder's operational mode. All have built-in stereo microphones, which record at the 16-bit/48KHz standard for DV audio, and all but the Hitachi let you record at a lower audio resolution (12-bit/32KHz) to gain an additional pair of audio tracks so you can perform in-camera dubbing, such as adding music or narration.

On all the camera bodies, one or more little panels open to reveal tiny compartments housing such connectivity options as minijacks for computer and A/V hookup, microphone inputs, and so on. A shoe sits atop three of the units (Canon, Samsung, and Sony), so you can connect such accessories as a flash or other lighting units, or an external microphone. All have remote controls, which will come in handy if you're filming yourself and when you've patched the unit into your TV for playback. All come with a USB cable and an A/V cable (composite video and left/right audio) and also allow S-video connectivity. All include a varying amount of bundled software (cross platform unless otherwise noted) for transferring and working with video and photographs.

Yes, each of the units does double-duty by taking still photographs. In most cases, this requires using a separate memory card. Most will accept both SD (Secure Digital) and MMC (MultiMediaCard) memory cards. Even at their highest quality and size settings, the photos are low-resolution, adequate for small snapshots when super-crisp detail isn't vital.

The fact that the camcorders' CCD (charge-coupled device) image sensors use even fewer pixels for video than for photos might seem confusing to some. But consider video's likely destination: An analog TV uses around 200,000 pixels in its display; the low-end standard for digital TV, SDTV (standard-definition TV), uses around 300,000. Camcorders at this level (forget about high-definition in this price range) are more or less shooting at a two- or three-to-one

Canon Elura 70
MiniDV Cam

pixel ratio—certainly acceptable quality for typical home video. On the other hand, a user is more likely to view a digital photo on a PC monitor, which has a much higher resolution than a TV, so digital photos make better use of the extra pixels.

To that end, we found that all units performed comparably well to one another in a variety of shooting situations, and the video quality among all the camcorders we reviewed was nearly identical. That being the case, our evaluation focuses mainly on the features and design aspects that differentiate them.

Canon Elura 70 MiniDV Cam

$799
www.canonusa.com

Measuring 5.75 inches long and barely more than 3 inches tall, Canon's Elura 70 is one of the most compact units here. But in that trim body it packs in a lot of useful, sometimes clever, features.

First, some basic specs: It records to MiniDV cassettes. As with our other MiniDV models, you can record at SP (standard play) or LP (long play), which increases a tape's recording time by a factor of 1.5. The image sensor is sized at 1.3MP (megapixels), with 1.2MP resolution for still photos and 690,000 useful pixels in video mode.

The 18X optical zoom covers a lot of ground. Beyond that point, a digital zoom takes over (if activated in the menu) with your choice of 72X or 360X magnification. The 2.5-inch LCD displays a color-coded bar to show how far along the zoom field you are.

For menu navigation, the Elura 70 uses a spring-loaded wheel/knob located on the front-left side above the Menu button. If you're bracing the camera with your left fingertips, these controls fall naturally under your thumb, enabling quick and intuitive menu use. Among other things, the wheel also controls manual focus, for precision adjustments in shooting circumstances that stymie the default autofocus (subjects that move rapidly, or are behind glass, or aren't centered, etc.). Behind the closed LCD panel are other controls, including a row of playback buttons whose VCR-like appearance makes them instantly familiar.

For general shooting, the Elura 70 has six modes optimized for specific conditions: Auto, Sports (for fast-moving subjects), Portrait (to soften backgrounds), Spotlight, Sand & Snow (to prevent underexposure in reflective environments), and Low Light. (The other camcorders offer similar lineups.) There's also an Easy Recording mode that is similar to Auto mode, although Auto allows for manual override; in Easy Recording, the camera is in total charge of settings. (All the units have some sort of equivalent to simplify operation for beginners.) Finally, three special modes come into play for night shooting. In two of them, the autofocus assist lamp remains on as a spotlight. The autofocus is slower and movement looks stuttery, but you can film in an otherwise pitch-black setting. Another shooting option we found thoughtful is Soft Skin Detail, which helps tone down imperfections.

Postproduction features abound, as well, with nine fades, nine visual effects (sepia tone, black-and-white, displaying the image in a rotating box, etc.), and a Card Mix mode that lets you overlay video footage with special still frames on the included 8MB SD card.

The Elura 70 also includes an add-on lens for even wider-angle coverage.

Hitachi DZMV580A

Hitachi DZMV580A

$899.99
www.hitachi.us

Instead of MiniDV cassettes, a DVD camcorder uses smaller versions (8cm) of the full-size recordable discs more commonly used in computers. The Hitachi DZMV580A accepts two types of discs: DVD-RAM (rewriteable) and DVD-R (single-use). Double-sided discs are fine, too; after you run out of space on one side, just open the circular access panel, remove the disc holder, and flip it over. On a DVD-RAM, you can get roughly 18, 30, or 60 minutes per side, depending on whether you've chosen very high, high, or standard quality. Each bit of continuous shooting is recorded as a scene. Because the unit automatically looks for the end of the previous scene before recording anew, it's impossible to overwrite anything, a handy safety net for accident-prone users.

Measuring 6.5 inches long and just over 3.5 inches tall, with a 2.5-inch screen, this one uses a 1.02MP sensor, providing a bit under 1MP resolution for still photos and 400,000 pixels for 4:3 video (530,000 for 16:9). The zoom clocks in at 10X optical, with 240X digital.

The unit's main navigation and playback tool is a stubby, multifunction joystick that makes it a breeze to zip through menus, trigger fast forward and slow motion, jump among scenes, and more.

However, the design team needs to go back to the drawing board on implementing manual focus and exposure. Manual control requires you to poke your finger at a pair of +/- membrane switches located inside the recess that's exposed when the LCD panel is open. Not only is this cumbersome, with

terrible tactile feedback, it also means you can't go manual when using the optical viewfinder.

We also found the still camera lacking. It performed fine in daylight but didn't do nearly as well as the others (or the Hitachi's own video mode) at making reasonably effective use of low indoor light. And photo playback on the LCD is excruciatingly slow. On the 256MB SD card we were using, it averaged seven seconds to move from one snapshot to the next.

Where the DZMV580A shines is in providing a complete onboard editing suite, called Disc Navigation. This is beyond the capabilities of DV tape. Because of the nonlinear nature of disc data, you can shuffle scenes into any order you wish, divide them, delete extraneous material, and more. And you can perform this on the LCD, on your TV screen (using the A/V output), or even via computer. This last option uses the bundled editing software (PC only) and requires that you attach the camcorder to a USB 2.0 port with the included computer cable.

Notably, this is the only unit in the roundup that lacks an IEEE-1394 jack, so it isn't directly compatible with other recorder/burners that use this protocol (also known as FireWire and i.LINK) as their DV connection.

JVC GR-D93US MiniDV Camcorder

$699.99
www.jvc.com

With its navy blue trim, the JVC stands out in a crowd that sticks mostly to silver. At 4.87 inches long and 3.62 inches tall, this is another of the subcompacts, with a 2.5-inch screen. It packs a 10X optical zoom, with 40X or 700X digital zoom. Detailed pixel specs were unavailable, but with a 1.33MP sensor, it's reasonable to assume they're comparable to the Canon Elura 70's.

The similarities don't end there. The JVC also uses a combination wheel and button for menu navigation, manual focus, and more, located atop the unit along with the snapshot button and

How To Use The Sony DCR-HC65 As An Analog-To-Digital Converter

All of the camcorders featured here let you perform dubbing to and from the unit, by connecting them to a VCR via the A/V jack, or (the Hitachi excepted) to a digital video component via the DV jack.

But Sony's DCR-HC65 Handycam (as well as Canon's Elura 70) can also serve as a converter, bridging the gulf between older analog components such as VCRs and newer digital devices such as computers and hard drive-based video recorders. The benefits should be obvious: You can take old, degenerating videotapes and give their contents a longer lifespan by digitizing them.

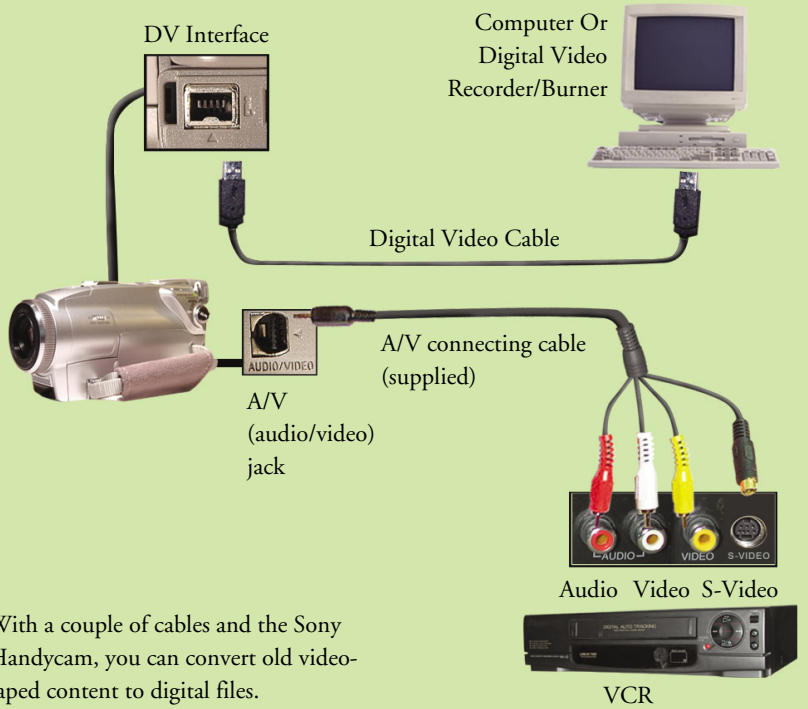
First, with all components turned off, make your connections as shown here. The Sony comes with an A/V cable that branches into four plugs: left/right audio, composite video, and S-Video. If your VCR has an S-video output, use that; it's superior to composite video. You will, however, need to supply your own DV cable. There's no need to have a tape in the camcorder, and you should power the unit from the adapter, rather than the battery pack alone.

Turn on the VCR, followed by the camcorder. Press the camera's rotary power switch to choose Play/Edit mode. Tap P-Menu on the touchscreen. Choose Menu and then press one of the arrows until the menu wheel rotates to Standard Set. Tap OK.

Next, rotate down to the A/V—>DV Out selection and tap OK. Choose On and then tap OK. If your source is using an S-video connection, rotate down one more menu item to Video Input and repeat the process to choose S-Video. Tap OK and then the X button to exit.

You're now set up to convert the input signal, so turn on your final component. Make whatever preparations are required to receive the digital signal. If you're sending it to a computer, for example, launch the software that will capture the digitized video.

Finally, start playback on the VCR and you're ready to roll.



With a couple of cables and the Sony Handycam, you can convert old videotaped content to digital files.

JVC GR-D93US MiniDV Camcorder

Zoom lever. With the camera strapped to your hand, this control center falls under your right fingertips, although you may find everything bunched too tightly for its own good. We're nimble-fingered, but more than once, while working the wheel, we accidentally hit the snapshot button and committed a still photo to tape (a taped photo displays for six seconds).

And like the Canon, the JVC GR-D93US has a spotlight for night shooting, fired from a dedicated button, plus a Night Alive option that brightens dim imagery. You can use these together or separately. Unlike the Canon, there's no shoe for attaching your own accessories.

When you break out of Automatic mode (where even the menu is inaccessible) in favor of Manual, you can take your pick of numerous custom menu options, such as a variety of wipes and fades, white balance, and manual exposure. Effected shooting modes include Sepia, Black & White, Classic Film, and Strobe (which reduces movement to a series of still frames). These are available in the playback effects, too. There are also 1/60 and 1/100 shutter speed settings to minimize certain side effects of shooting TV screens or under fluorescent lights.

You can also use the GR-D93US as a Web cam. Just plug it into a computer using a USB cable.

Samsung SC-D107 MiniDV Camcorder

$499.99
www.samsungusa.com

At 6.25 inches long and 3.5 inches high, Samsung's SC-D107 is noticeably longer than the previous units, with the extra length put to good use. Instead of a 2.5-inch LCD, the unit has a 3.5-inch display. That's just one extra inch in diagonal measurement, but it more than doubles the screen space: 6.1 square inches, rather than 3 square inches. This not only provides a clearer, more pleasing image for monitoring and playback; the menu display is less cramped, as well.

One design choice could cause problems, though. The front of the camera houses the largest night-light in the bunch. It's very effective but left no room for the stereo microphone, which on all the other units is front-mounted. Instead, it's on top, in a risky place: If you have large hands, or just long fingers, when the cam is strapped on, your

Most-Wanted Features

With all those digital camcorders out there to choose from, how can you make sure you end up with the right one for you? Don't buy on impulse, and factor in these considerations first:

Ergonomics. When shooting still photos, you're basically an observer, working from the outside. With video, you're a more obvious presence, a part of the action. Because that action is ongoing, forcing you to react to changes, camcorder operation must be fluid, without a lot of fumbling for controls. So it's impossible to overstate the importance of how the camera feels in your hand—its balance—if the most frequently used controls are at your fingertips. Because people's hands vary widely in size and shape, a camera that feels natural to one person might feel awkward to another. Spend time trying out a few in a store, including making manual focus and exposure adjustments. Ideally, you'll be able to find one that feels as comfortable as a glove.

Tape vs. disc. Which is better? That depends on your shooting habits and the kind of convenience you're looking for. MiniDV cassettes and recordable DVDs both have advantages and drawbacks as recording media. DVDs require no rewinding, and the discs may be immediately playable in other machines. Many players and computers will ignore rewriteable DVD-RAM discs, however. The more widely compatible DVD-R discs are, unfortunately, single-use. Also, DVD camcorders can take longer to boot up. Our MiniDV cams fired up ready to roll, but the Hitachi DVD camcorder required about nine seconds before it was primed.

High optical zoom. Camcorders generally provide both optical and digital zoom. Optical does a superior job, so give its magnification spec the most weight in your purchase decision. An optical zoom utilizes the lens to get up close and personal. A digital zoom merely enlarges the closest image that the optical lens is capable of capturing. This is useful to a point, but before long the image begins to show obvious pixilation. At the extreme end of a digital zoom's range, a handheld shot is hopelessly jittery, and the image can be sensitive to movement even with the camera stabilized. Digital zoom numbers up in the hundreds may look impressive, but we couldn't come up with a situation in which they were actually practical.

pinkie might rub over the right mic input, or at least close enough to generate unwanted noise. There's no shoe to mount a separate mic, either.

Cited sensor specs are 680,000 pixels, although inquiries as to exactly how those are allocated went unanswered. The SC-D107 has the strongest zoom in our roundup, with 20X optical and four levels of digital zoom up to 900X. The main controls are a vertical row of Menu and Enter buttons and a menu/volume/focus dial, located on the left rear. The placement feels natural and promotes accuracy.

The SC-D107 has some unique features we loved. Quick Menu is a nifty addition that lets you spin the dial to instantly access menu options you would otherwise have to dig for. This will let you toggle one of its nine special effects on and off while shooting, change the white balance during a tracking shot, plus much more.

And let's get back to night shooting for a moment. We already mentioned the sizeable lamp, which is the most powerful in the group, giving good clear results with none of the stuttery motion of the Canon or JVC. But there's also a separate Power Night Pix option, which uses an infrared lamp. The resulting video is colored the eerie green hue you'll probably recognize from wartime footage.

Finally, this one employs a Fade button to manually control fade-ins and -outs. Mac users alert: The bundled software is for Windows only.

Samsung SC-D107
MiniDV Camcorder

Sony DCR-HC65 MiniDV Handycam
$799.99
www.sonystyle.com

Here we have our biggest camcorder, measuring 6.75 inches long and 3.5 inches high. Its curves give it a more streamlined appearance than the rest, so streamlined it seems short of controls. That's only until you discover that its 3.5-inch LCD acts as a touchscreen interface. This not only lets you tap your way through the extensive menu (which is animated and can be customized, to boot), but you can also use the touchscreen to select objects for Spot Metering and Spot Focus and target areas for magnification during playback. Another unique touch: Manual Focus uses a lens ring, which will likely feel the most natural to experienced still photographers.

The DCR-HC65 has a 1.07MP sensor, providing 1MP resolution for snapshots (this being a Sony product, a Memory Stick is your only choice of card) and 690,000 pixels for video. Zoom specs are comparatively humble, at 10X optical and 20X or 120X digital.

Like the Samsung, the Sony's two Night Shot Plus modes use an infrared lamp. Unfortunately, there's no white light at all. In the dark, it's green or it's unseen. In dim lighting, the Color Slow Shutter option will brighten things a bit, but the sluggish tracking leaves movement resembling a flipbook. Unique among shooting modes is Landscape, which prevents the autofocus from gravitating toward nearby objects.

For creative shooting, there are six fades, three of which (Overlap, Wipe, and Dot) impose a gradual transition from the previous scene, rather than an abrupt cut. Digital effects include some interesting blurs and, of course, Old Movie; some of the effects (which can also be applied during playback) are adjustable in strength, rather than simply on/off. You can superimpose video over a still image, and, like the Canon, Memory Mix lets you overlay video with frame-like images from the included card.

Sony DCR-HC65
MiniDV Handycam

The DCR-HC65 is also unique in its inclusion of interval recording. You can set up the camera to shoot video every 30 seconds, or one, five, or 10 minutes, for a duration of 0.5, one, 1.5, or two seconds. The result: A time-lapse photography sequence shot on tape.

Ready For Their Close-ups

On video quality alone, all the camcorders performed well in our experience. We admired the compact yet feature-rich Canon and JVC models. The Samsung blew away the competition when it came to night shooting and sells for a great price. The Hitachi is its own mobile editing room and creates DVDs.

Still, we give the nod to the Sony DCR-HC65. Its touchscreen is a pleasure to work with, and it balances useful features and smart design as well as any of the rest while keeping cost reasonable. Finally, the image quality and color are unsurpassed . . . and that's really the bottom line, isn't it? CE

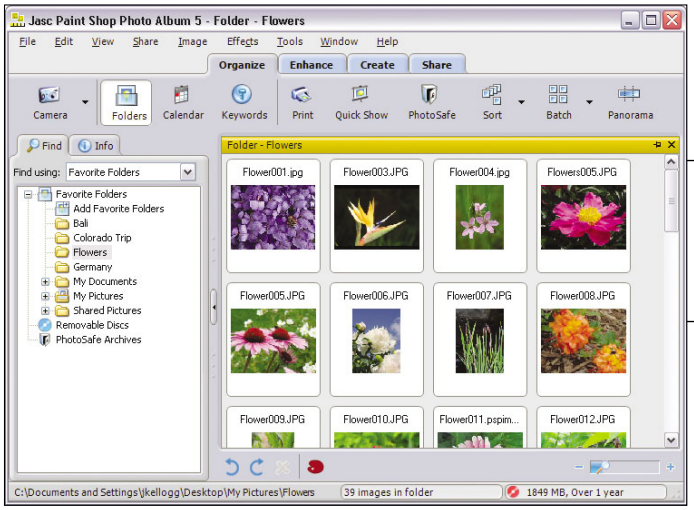
BY BRIAN HODGE

Jasc Paint Shop Photo Album 5—Deluxe Edition

The more digital photos you collect, the tougher they become to manage. You have to keep track of where you stored them and remember what your camera naming conventions mean. Then you have to buy image-editing software to crop, color, and resize the your digital images. Finally, to send them out, you may need to use separate printing, emailing, Web publishing, and project applications. Right? Wrong. Jasc's Paint Shop Photo Album 5—Deluxe Edition helps with all those things.

First, the Organize tab offers a variety of options for browsing, searching, and arranging files. The Folder view lets you browse through hard drives, removable disks, and peripheral devices (including cameras and memory cards). You must "catalog" a folder in order for its images to appear in Photo Album. You can catalog directories manually or scan entire drives with the automated cataloging tool. You can also view images by Calendar (sorting by date saved) or Keyword (searching custom-made metatags or file information). The drag-and-drop mechanism makes managing large groups of pictures a snap. The Enhance tab, which opens when you select an image, provides a large preview pane in the center, with a current folder directory on the right and file system browsing on the left. A useful toolbar presents a variety of editing tools, such as Crop, Red Eye, and Add Text. Additional options include Quick Fix (auto-adjust color, contrast, and brightness), manual adjustments, and the ability to add edges or frames to an image.

The Create and Share tabs are where things get interesting. Photo Album 5 includes several predefined projects, including albums, greeting cards, and calendars. Simply choose a template, pull in images, and then customize their appearance or information. Jasc even partnered with MyPublisher to create an option for custom-printed hardcover picture books. Select images for the cover and pages, add text, select a style, and upload the book project to MyPublisher (www.mypublisher.com), a custom printing company. In less than a week, you'll receive a hardbound coffee table book for just $29.95 (10 pages, $2.95 for each additional page). The Share tab includes such functions as CD burning, Web publishing (with FTP access), printing, and email.



Though setup is easy (there's almost no configuration to do), Photo Album's documentation is disappointing. The Get Started Guide doesn't introduce you to the program's interface or layout, and the 166-page User Guide is in the worst tradition of dense, feature-heavy technical manuals. It'll be hard for novices to read, and there is no Quick Start guide for those who simply want to quickly master the basic features. So, you may need to figure out the controls on your own. Thankfully, most of the crucial options are obvious. The Search feature, though, isn't nearly as accessible or intuitive as it should be. And simplified buttons and wizards, though nice for automating basic functions, are limiting in ways that can frustrate advanced users.

But Photo Album isn't without usability pluses. Batch control over renaming, resizing, and saving photos is a godsend for users handling lots of files. And the Zoom slider is a great touch. The tool makes it easy to adjust the size of thumbnails or image previews. The scope of editing tools is impressive for a product in this price range. Quick Fix and the Adjust Wizard simplify image editing for novices, but experienced users will appreciate manual controls over such elements as digital flash, color balance, and saturation. We're not talking design-grade tools here, but they're everything you need for touching up snapshots.

Jasc Paint Shop Photo Album 5—Deluxe Edition
$45 download; $49 box
www.jasc.com

And, when you bump up against Photo Album's limits, there's a one-click button at the bottom of the screen to launch your default image editor (Paint Shop Pro or Photoshop, for example).

If you're a digital photography buff and enjoy editing and sharing your pics, $45 is a fair price for all that Photo Album 5 can do. It's not that the program does anything other apps don't do—it's that it does them all in one place. Rank novices will struggle with all the options and poor documentation, and serious technophiles will chafe at the program's relative simplicity. But moderately experienced users who want to focus on their images more than on their technology will appreciate this program. ■

BY GREGORY ANDERSON

Basejet Mail

Palm OS-based smartphones are a big investment. When you spend that much on a phone, it's important to find new ways to make it useful. If you've ever considered using your smartphone to send and receive email, Basejet has the application for you.

Though Basejet offers corporate and desktop versions for syncing a variety of enterprise email systems, we stuck to the wireless handheld client (running in Standalone mode). Just download the application (there's a free 30-day trial) and open the .PRC file. Your next sync will install the program. Setting up accounts is relatively simple. Click the mailbox icon and choose Edit Mail. Select the Add button and step through the menus. Next, name the account, choose POP3 or IMAP service, enter a username and password, and set the authentication options. Finally, set formatting and attachment preferences and then save. Repeat for as many accounts as you'd like to manage. Check with your wireless and email provider for server and account information: You may also need to configure outgoing mail settings and ports.

Basejet Mail
$45
www.basejet.com

Basejet's interface is about as simple as email clients get. A status bar at the top lists the current account and folder. One-touch action buttons (including Search, Compose, and Synchronize) line the bottom, and messages fill the rest of the screen. The two-line display shows the sender, date/time, and subject for each message, and a single tap opens the item. Support for Word, Excel, and PDF files makes it easy to review attachments. Extra options schedule automatic email checks and record information to your Contacts list. Composing messages is just as simple. Enter text from your Graffiti area or keypad, set BCC and priority options, and save or send. We found the ability to insert information from our Contacts list a particularly nice touch. Our only complaint is that the Forward option is buried as a Reply type (along with Reply All and Reply Sender) instead of standing out as its own option.

There are plenty of POP3 email clients out there, but the list supporting IMAP is much smaller. And applications for smartphones with user-friendly interfaces and tools are a rare breed indeed. If you're looking to augment your smartphone's value with portable productivity tools, Basejet is worth the investment. ■

BY GREGORY ANDERSON

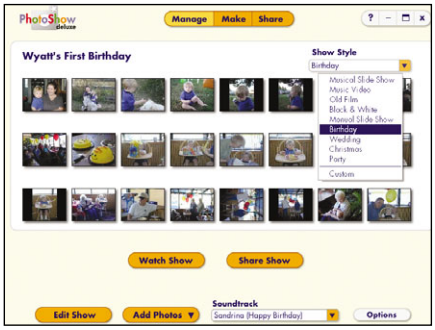
Simple Star PhotoShow Deluxe 3.0

Many digital camera buffs like to create CDs full of photos and email pictures to friends. You can use PhotoShow Deluxe 3.0 for those simple tasks, but there's a lot more to this program: You can also edit your images and create fun, sharable slideshows, and you can even add soundtracks to them.

PhotoShow Deluxe does four things: manage files, edit images, produce musical slideshows, and create photo-related products and gifts. Simple Star's system organizes images into albums. By default, each scanned folder is an album, though you can create custom albums and collect photos from a variety of directories. Sharing an entire album is astonishingly easy: Just click Share, choose Email a Link, enter a recipient, type a message, and send. The email contains a link to a basic slideshow consisting of images in the folder. The same process applies for single pictures. PhotoShow's Editing tools are more robust than we expected. You can add filters, draw on images, crop, and adjust color levels.

You'll have fun with your photos when using this program. Its musical slideshows are the best feature of this program. Just pick the photos, choose a style template and some slides, pull in music (from the program's 100-track library or your own MP3 files), and publish. There are dozens of clip-art elements to drag onto each picture. Simple Star maintains free online hosting at photoshow.net, so sharing your creations with family and friends is as easy as emailing photos. You can also publish the slideshow to CD, VCD, or HTML. PhotoShow Deluxe also lets you create, preview, and order T-shirts, coffee mugs, and playing cards displaying your images.

The user interface is clean and simple. With large buttons and an uncluttered design, the program is accessible to the greenest of novices. The cost may be a little steep for casual users, but you're paying for the online and emailing services as well as the software. However, for anyone who loves playing with pictures and sharing with friends, PhotoShow Deluxe makes the process easy and adds lots of fun options. ■



Simple Star PhotoShow Deluxe 3.0
$49.99
www.simplestar.com

BY GREGORY ANDERSON

Give *your* car the luxury of satellite navigation.

© 2003 Garmin Ltd. or its subsidiaries

The StreetPilot® III from Garmin has features found in expensive in-dash navigation systems, plus one very important quality the others don't have. StreetPilot III is portable, so you can have the best in GPS navigation in any car you drive. Look up addresses, attractions and other services, and StreetPilot III will create a route and provide turn-by-turn directions with voice prompts to get you there.

StreetPilot III and GPS V from Garmin. Navigation for every car.

GARMIN. www.garmin.com

Available at: BEST BUY CompUSA

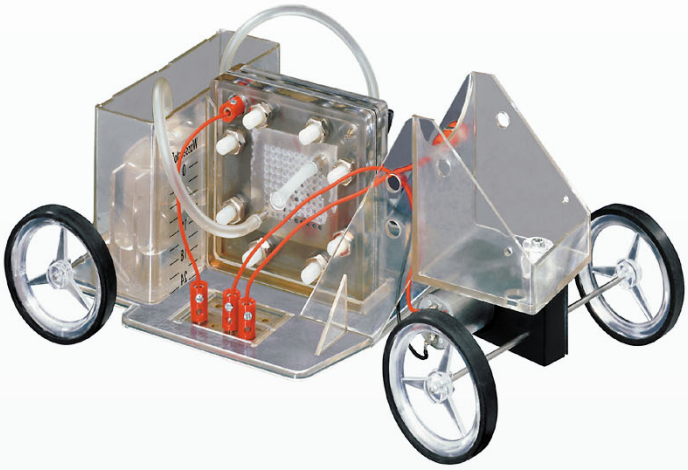
CE Lite

On The Lighter Side Of Technology

Compiled by Marty Sems

I/OMagic Sound Assault Headphones

Kids in bed? Live in an apartment? Or are your parents threatening to cut the power to the basement if you don't turn down your infernal racket? Take back your right to blow your own eardrums with I/OMagic's Sound Assault Headphones ($99.99; www.iomagic.com). With eight speakers per side (two front, two center, two rear, and two subwoofers), the Sound Assaults claim to support Dolby Digital AC-3 5.1-channel surround sound. Separate volume controls for each channel let you tailor the levels lashing your lobes, the booms bruising your brainpan. Time to chalk up a pair of Assaults on your record.



Thames & Kosmos Fuel Cell Car & Experiment Kit

Be the envy of your hipster friends with a toy that's actually relevant to geekdom. Fuel cells are all the rage in notebooks, mobile devices, and even cars. Find out how they work with the Fuel Cell Car & Experiment Kit from Thames & Kosmos ($150; www.thamesandkosmos.com). You'll be able to build your very own transparent car that runs on nuttin' but water, and do about 30 more experiments. Dude, this thing even comes with protective goggles. It requires goggles, man! Whoa!

Philips KEY019

Your life as a super-spy just got easier. Sneak the Philips KEY019 out of Q's workshop, and you'll feel a little warmer out there in the cold. This tiny gizmo is an MPEG-4 camcorder (25-minute capacity) and a 2MP (megapixel) digital still camera (up to 200 images), so all your surveillance and intelligence gathering can remain covert. It even has a dinky lil' color LCD viewfinder. The KEY019 is also a 128MB USB flash drive so you'll have somewhere to put all those stolen plans for cold fusion apparati and whatnot. Finally, it's also an MP3/WMA (Windows Media Audio) player, so you can pack it with spy movie getaway music from John Barry, Lalo Schifrin, and Henry Mancini. Off the rack, the KEY019 is about $266 (www.press.ce.philips.com/press/2004-2-23-Cebit2004-568.html).

SanDisk 6-in-1 PC Card Adapter

The venerable PC Card slot is being phased out, but there are still great products being released for it. Witness SanDisk's 6-in-1 PC Card Adapter ($29.99; www.sandisk.com). The six flash memory card formats it supports are SD (SecureDigital), MMC (MultiMediaCard), Memory Stick, Memory Stick Pro, xD-Picture Card, and SM (SmartMedia). No, that list doesn't include CF (CompactFlash), but SanDisk also sells CF-to-PC Card converters for just $9.99. If you're a notebook user who deals with lots of digital camera and music player flash memory cards, SanDisk's 6-in-1 adapter is a great deal.

Diver Entertainment Systems H2O Audio Oceanic DV-512

The Aughts (or '00s, if you prefer) is the decade of the personal soundtrack. More than ever before, at work or at play, everyone is listening to their mix CDs, iPod playlists, and XM radio. It almost seems like we dive for our music whenever a moment of uncomfortable silence threatens. Now, with products such as Diver Entertainment System's DV-512 ($649.95; www.desworldwide.com), you can dive with your music. This aquatic sound system's iRiver 395 player can play up to 512MB of your MP3s and WMAs with a 24-hour battery life. It's depth-rated to 200 feet. DES also sells 256MB ($549.95), 128MB ($489.95), and 64MB ($449.95) versions for shorter swims.

KidzMouse

Awww. Here's something for the little shaver in your family, the larval- or pupal-stage geek who's never known a world without broadband. For $25 and up, you can get her a ball mouse that looks like a beetle. The glow-in-the-dark Paloma FireFly is shown ($24.95; www.kidzmouse.com). The CoolBug ladybug is our aesthetic favorite, but the upcoming $29.95 BenjiBee ScrollMouse will be more useful because it has a scroll wheel. Each mouse is compatible with Macs and PCs and comes with a USB-PS/2 adapter. Remember, the earlier you can cultivate a computer obsession in that special youngster, the sooner she can supplant you as the family's tech support slave.

Music & Movies

The Latest Tracks & Flicks: Are You Not Entertained?

Elvis Presley
"Elvis: '68 Comeback Special - Deluxe Edition DVD"
BMG
www.elvisdvds.com
Our take: The King's very finest hour.

Elvis Presley

Sadly, Elvis Presley has been gone long enough now that for at least a couple of generations of youth, he has become little more than a long-lost idol of worship to legions of whacky fans who can't let Memphis' fallen son go. What's mostly lost in that spectacle of devotion is the talent, power, and king-of-his-domain attitude that made Presley rock and roll's most famous and most important performer ever.

If you're of the generations that don't get it, "Elvis: '68 Comeback Special" is the most glaring example of why Elvis is Elvis to so many fans. Unflinching, uncompromising, and unapologetic, Elvis was never finer than on this special that was taped in an NBC studio in June 1968 and aired Dec. 3 of that year. An incredible 42% of the U.S. viewing audience was estimated to have watched the show, belting out full throttle from his gut's bottom the songs that had made him America's best-known man. Beyond being his finest hour, the '68 special remains one of music's most definitive events ever.

Various editions of the '68 comeback have appeared before on VHS and DVD, but this is the collection to own. Included is the entire television special without commercial interruption, including a sexually charged bordello dance-song number that wasn't aired with the original special. The three-disc set also includes all versions of what have since become known as the black-leather sit-down and stand-up sessions. The two sit-down performances he filmed (much of the second version has never been released previously) are especially incredible, with Elvis being joined in a circle by original guitarist Scotty Moore and long-time drummer DJ Fontana, among others.

At one point, when Presley thinks the television cameras aren't rolling, he takes over Moore's electric guitar and proceeds to churn out wonderfully dirty blues-based chords on "Baby, What You Want Me To Do," "Blue Christmas," and more. The fun that Presley is obviously having is something fans would rarely witness throughout the remainder of his career.

Disc 2 contains the two black-leather stand-up versions Elvis performed, plus various takes of the special's production numbers, including the "Trouble/Guitar Man" sequence and "If I Can Dream" closer, featuring an Elvis dressed in white suit and red tie. Disc 3 features more production number footage and takes of the show's gospel number and the show's opening and closing numbers.

For as much as this set includes, what it doesn't include is just as glaring. Special features are all but nonexistent, which is somewhat understandable, as Elvis Presley Enterprises has ruled all Presley-related material with an ironclad fist for years now. In addition, the video quality is a bit soft in places. Still, the remastered 5.1 Dolby Digital sound is stellar. In all, the set (in full-screen format) contains more than 440 minutes of original and bonus footage that any self-respecting Elvis fan should immediately make his or her own. ■

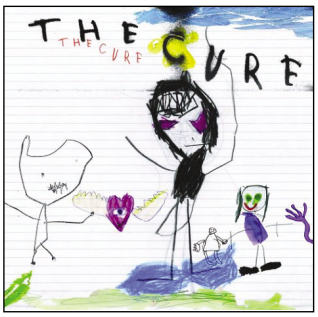
BY BLAINE A. FLAMIG

The Cure

After 2000's septic "Bloodflowers," it appeared The Cure had worn out its welcome and was headed down that long road on which bands that don't matter anymore inevitably travel. Not since the inspired work on 1989's "Disintegration" had the band fired on all cylinders, turning out the type of dark, brooding pop that The Cure ringleader Robert Smith seemingly cornered the market on.

Thankfully, the band has taken a most-welcomed detour with this self-titled effort. As a collective, the 11 songs on "The Cure" are as strong as any record the band has recorded in its nearly 25 years of existence. (The Cure lineup has been an endless rotation of players, but Smith has always been the unquestioned driving force.) There are several reasons for the album's impressive strength, but bringing aboard Ross Robinson (Slipknot and Limp Bizkit credits) to assist with production chores stands chief among them. Smith and Robinson put the guitar clearly at the forefront of the audio assault in most of the songs, and the results are a grungier Cure than we're used to.

On the opening cut "Lost," Smith repeatedly wails in his trademark snarl, "I can't find myself" under a simple riff that picks up steam and tension until the song explodes into Smith screaming over a wave of swirling chords and a steady backbeat. The song's simplicity is its beauty, and it's a strategy the band sticks to throughout.



The Cure
"The Cure"
Geffen Records
www.thecure.com
Our take: The Cure all grunged out? Very nice, indeed.

Most of "The Cure" was recorded "live in a candlelit room & mixed very loud in the dark," and the straight-on approach literally pulsates the album. The back-to-back slam of "alt.end," "(I Don't Know What's Going) On," and "Take Off" is as charged as The Cure has sounded in a decade or so, and Smith's vocals absolutely shine here. His lyrics surprisingly even approach optimism on a few fronts, including on "Before Three" (The happiest day I ever knew/In a sea of gold down next to you). But Smith is the king of Goths because he looks inward, wraps his hands around the necks of his demons, and rips them out his throat for the world to see. Take "Us Or Them," for example: There is no terror in my heart/Death is with us all/We suck him down with our first breath/And spit him out as we fall.

Some critics are calling "The Cure" a comeback, but the album seems more of an adventure down roads less traveled. Whatever it is, the scenery is fantastic. (Look for the album's enhanced version, which includes a DVD featuring about 20 minutes of in-studio footage.) ■

Wilco

Wilco
"A Ghost Is Born"
Nonesuch Records
www.wilcoworld.net
Our take: The delightful exploration into strange sounds continues.

The story surrounding Wilco's 2002 "Yankee Hotel Foxtrot" has been told numerous times in numerous places, but it's worth repeating to give you an indication of what kind of band Wilco is (and who leader and chief songwriter Jeff Tweedy is, for that matter).

After wrapping up the recording of the album, the band's then-label Reprise rejected it because it felt the songs were too weird. The label, a subsidiary of AOL-Time Warner, then dumped the band. Nonesuch Records, which happens to be a subsidiary of AOL-Time Warner, won the ensuing bidding war for the album. So in effect, the company paid for the same album twice. "Yankee Hotel Foxtrot" debuted at No. 13 on the album charts, made practically every reviewer's best of the year list, and became the band's best-selling album to date. Beyond the strangeness of the details surrounding the album was the strangeness that populated the song's sounds, marking an incredible departure from the band's previous characteristic alternative-country sound.

"A Ghost Is Born" is a further exploration into that strangeness but in a different realm. Here, Tweedy and band are stretching, condensing, and distorting notes to create a batch of lilting, floating tunes that are at once placid and violent. The opening cut "At Least That's What You Said," is a page right out of Neil Young and Crazy Horse's book, starting off soft and unassuming until the tune blows up in a massive distortion of ricocheting bullets.

For the most part, "A Ghost Is Born" is understated and grounded, sticking to pretty much the same tempo. However, instead of becoming monotonous and worn out, the songs become endearingly hypnotic.

On "Hell Is Chrome," Tweedy follows an inviting piano intro with, "When the devil came/he was not red/he was chrome and he said/come with me." He follows the verse up with a George Harrison-like guitar riff that serves as the song's drowning undercurrent. On The Replacements-like "I'm A Wheel," Wilco picks up the tempo, showing off its ability to rock. But smoothly sailing along is the essence of "A Ghost Is Born," even when the subject matter is more scathing, such as on "Company In My Back," which seems a veiled shot at Reprise.

On its last two albums (both featuring the integral production assistance of Sonic Youth's Jim O'Rourke), Wilco has morphed into one of rock's most important and creative bands. Here's looking forward to what it comes up with next. ■

BY BLAINE A. FLAMIG

The Butterfly Effect (Infinifilm Edition)

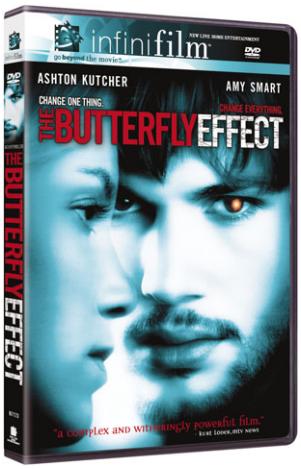
Good Try, But No Cigar

Evan Trehorn is a 20-something-year-old college student with a troubled past. As a child, he was advised to keep a journal of his hardships when he was growing up. Now, as an adult, he discovers that he can jump into the past when he studies his old journals. Naturally, he heads back into his past and quickly learns that fixing problems in his past has awful repercussions in the present day. The film features an interesting (if unoriginal premise) and winds its way to a somewhat predictable ending. Infinifilm Editions are laden with extra material, and this is no exception: You can view the much-improved 119-minute version for the first time. It's a better film than the theatrical cut and features a much darker alternate ending.

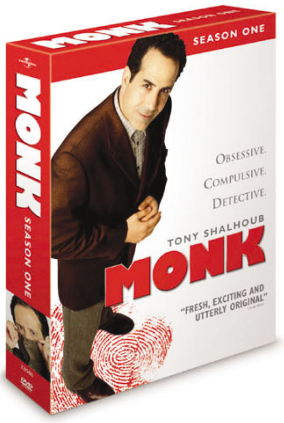
It's difficult to see Ashton Kutcher outside his comedic characters, and "The Butterfly Effect" will do little to change your opinion. However, Kutcher makes a valiant effort and turns in a believable performance as Trehorn.

As expected, the video quality of both editions is spot-on. The slight grain seen throughout the film is intentional because "The Butterfly Effect" is supposed to be a creepy, dark, gritty sci-fi thriller. The film's edge enhancement was not noticeable, and we didn't spot any compression-based artifacting. There are a plethora of audio options available, and we'd recommend the DTS ES track if you watch the Director's Cut. For the most part, there's not a whole lot going on in the surround channels except when Evan has his flashbacks. The dialogue and effects are all clear and more center-channel-focused. Beyond the extensive extra featurettes are some nice DVD-ROM additions, such as MCE-enabled content, Script-To-Screen Viewer (that lets you view the screenplay with or without the movie), and the excellent Commentary Digest.

"The Butterfly Effect" is an enjoyable, if predictable, film for fans of sci-fi noir. As always, New Line has put together an excellent Infinifilm Edition. This film is rated R. ■



Disc Specs: 113-minute theatrical version and 119-minute Director's Cut; 1.85:1 Anamorphic Widescreen; English Dolby Digital 5.1 EX and Dolby 2.0 for theatrical version, plus 5.1 EX and DTS ES 6.1 for the Director's Cut (English and Spanish subtitles included for both); Director/Writer commentary audio track; nine deleted scenes (featuring two alternate endings); four featurettes; theatrical trailer; and extra DVD-ROM content.
Studio: New Line
MSRP: $27.95



Disc Specs: 563 minutes spanning four discs and 13 episodes; 1.78:1 Anamorphic Widescreen; English, French, and Spanish Dolby Digital 2.0 audio tracks with subtitles for aforementioned languages; five featurettes featuring interviews with cast and crew.
Studio: Universal
MSRP: $59.98

Monk: Season One

Columbo & Monsieur Poirot Have Some Competition

"Monk" won instant acclaim when the first season premiered on the USA channel back in 2002. Adrian Monk (Tony Shalhoub) is a rather brilliant but quirky detective (a la Columbo) with certain, shall we say, *issues*. We learn that the light of Adrian's life, his wife Trudy, was murdered a few years before the start of the show. The tragedy mentally pushed Adrian over the edge, and the slight neurosis he had at the time amplified into an extreme obsessive-compulsive state that left him unable to function properly in today's society, forcing him to leave his position as detective on the San Francisco police force. However, his old colleagues still consult with him on particularly tough cases. Adrian would like nothing better than to be rid of his phobias and get back to work. Bitty Schram, who plays Sharona Fleming, is Adrian's nurse and personal assistant. She accompanies him on his investigations and their sometimes conflicting dynamic is filled with good humor.

Each episode follows the same vein of shows such as "Columbo" and "Murder, She Wrote." There's a crime, and the main character's ingenuity comes into play to save the day. What sets "Monk" apart is Adrian's disorder. It simultaneously lends a touching emotional poignancy to his very likeable character while providing ample opportunity for laugh-out-loud comedy. Shalhoub plays his character to perfection: Shahloub *is* Monk.

The video quality of each episode in the box set is substantially better than what's presented on TV, and having a 16:9 anamorphic presentation of each show is excellent. The clean and clear audio is presented in stereo and is primarily dialogue-driven. It's not fancy but does the job effectively. We had expected much in the way of extras (deleted scenes, bloopers, commentary), but much to our disappointment, this box set is pretty lean. There are a few cast-related pieces, but nothing to sink your teeth into.

"Monk" is a show that is at once charming and entertaining. Of course, it would be overkill to sit down and try to watch all 13 episodes spanning the four discs back-to-back, but "Monk" comes very highly recommended as a quality family-friendly show when so many prime time shows are often off-limits for family viewing. The show is rated TV-PG. ■

BY SAMIT GUPTA CHOUDHURI

Game On

This Month's Blockbusters Will Twist Your Mind

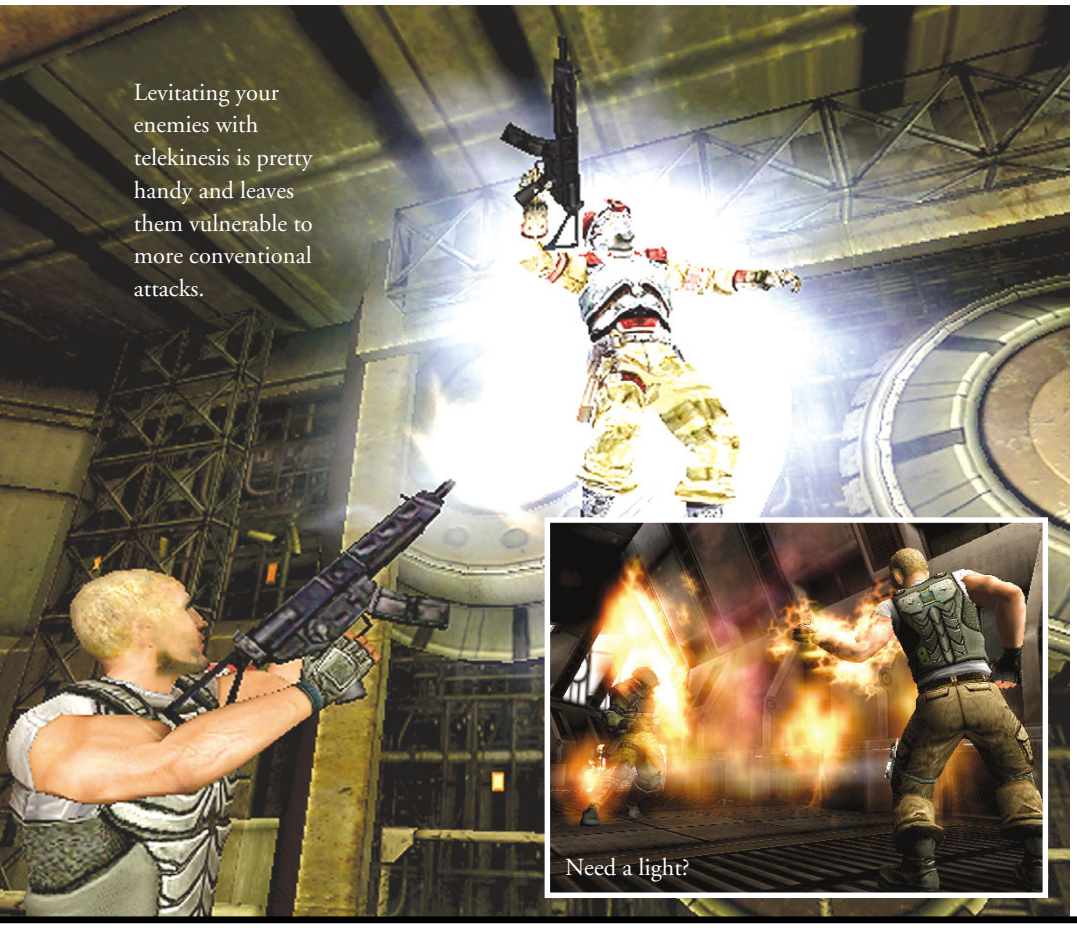
Psi-Ops: The Mindgate Conspiracy
(PS2, Xbox)

If there's one thing that the video game industry does well, it's copying proven formulas to sell games. Let's face it; the vast majority of games on the shelves in stores right now offer very little in the way of innovation, which is why Midway's Psi-Ops: The Mindgate Conspiracy is such a refreshing change of pace. Psi-Ops is a third-person action game, and, of course, there's no shortage of those. But instead of relying solely on pistols, machine guns, and shotguns to take on enemy forces, your character (a highly trained military operative named Nick Scryer) also has access to a plethora of psionic abilities, and this is where Psi-Ops really sets itself apart.

When the game begins, Nick has his memory wiped by a military doctor so that he can infiltrate a shadowy cabal of psionic terrorists called The Movement without being detected by their mental powers. He is captured during a raid on a secret Movement base and is soon contacted by Sara Blake, a government agent posing as a Movement operative who is really part of a special psi-ops unit known as Project Mindgate. Sara gives Nick a shot of something to help him recover his memory, but instead of remembering who he really is and recovering all of his special abilities, he remembers only flashes of his past and recovers his powers one by one as the game progresses. With each new ability, Nick "remembers," the game takes you back to Nick's training so that you can learn how to use the new technique.

Nick's psionic attacks and techniques, which include telekinesis, pyrokinesis, remote viewing, mind drain, mind control, and aura view, are easy to learn and make playing Psi-Ops a flat-out blast. Thanks to highly interactive environments, solid physics, and fairly intuitive controls, you can take any number of approaches when confronting enemy forces. Need to subdue a guard? You can shoot him if you like, or you can sneak up behind him and knock him out by hand. Or you can also levitate him and chuck him against a wall or off a catwalk. Or levitate him, smack him against a wall, then shoot him. Or you can levitate a heavy or explosive object from your surroundings and fling it at him. Or torch him with pyrokinesis, or take control of one of his comrades and make them shoot him, and so on. The possibilities for mayhem in Psi-Ops are limited mostly by your imagination, and we managed to imagine quite a bit.

The game looks pretty good and offers a full complement of sound effects and high-quality voiceovers that help to pull players into a decent if somewhat predictable story. In the end, though, the real star of this game is its open-ended approach to gameplay, which is more than worth the price of admission all by itself. ■



Levitating your enemies with telekinesis is pretty handy and leaves them vulnerable to more conventional attacks.

Need a light?

BY CHRIS TRUMBLE

Psi-Ops: The Mindgate Conspiracy
$49.99
Midway
www.psiopsgame.com
ESRB: Mature

Transformers (PS2)

"More than meets the eye." That was one of the taglines to the old Transformers cartoons, and it aptly sums up this fantastic PlayStation 2 adventure. Initially, the game seems like little more than a quick effort to cash in on the popularity of the show. Players can control only three Autobots (the zippy Hot Shot, the stout Red Alert, or the powerful Optimus Prime), and there are only a handful of levels to explore. But the game levels are diverse, packed with detail, and absolutely enormous; and Transformers includes a clever power-up system that ensures players will spend hours exploring every nook and cranny.

The jungle environments in Transformers are packed with trees and teeming with foes.

All Autobots begin the game with basic weapons and abilities, but special Minicon upgrades scattered throughout the levels grant access to more powerful armaments, shields, and even wings. Each Minicon requires a certain amount of power to operate, and up to four can be equipped at any one time. By the end of the game, players must make some very tough decisions regarding the optimum offensive, defensive, and special ability load-outs.

Players will need all the help they can get because enemies are numerous and tend to fight in packs. These firefights are a cakewalk compared to the harrowing boss battles that cap the end of nearly every level, each involving powerful Decepticons and requiring specialized load-outs and a lot of skill to complete. Thankfully there are plenty of save points and unlimited lives that encourage exploration instead of fostering frustration, and the expansive environments and beautiful graphics will have players riveted to the screen until the Autobots prevail. ■

BY TRACY BAKER

Transformers

$49.99
Atari
www.atari.com
ESRB: Teen

Samurai Warriors (PS2, Xbox)

Koei's long-running Dynasty Warriors series has improved incrementally over the years, adding only minor elements to its core gameplay that lets players slash or bash their way through literally hundreds of enemies using an ever-more-impressive repertoire of moves. Samurai Warriors changes the setting from feudal China to feudal Japan and adds some graphical upgrades, but its boring indoor missions and a new focus on achieving goals to advance the plot instead of fighting your way to victory make this one of the lamer entries in the series.

The core gameplay still involves a lot of button mashing as players string together simple combo after simple combo to strike down foes. The included character creation tool is more robust than those included in some of the Dynasty Warriors games, and players are also free to choose one of the 15 historical characters. Players gain experience as they complete missions, letting them "purchase" upgrades that add to their offensive and defensive abilities. This is the best part of the game and the most compelling reason to continue playing, along with the opportunity to find better weapons and other equipment that can dramatically boost a character's power. The graphics are much crisper than those found in the previous series, and there is less slowdown than usual during battles involving a lot of enemies.

In Samurai Warriors these sorts of odds are entirely unfair—to the enemy.

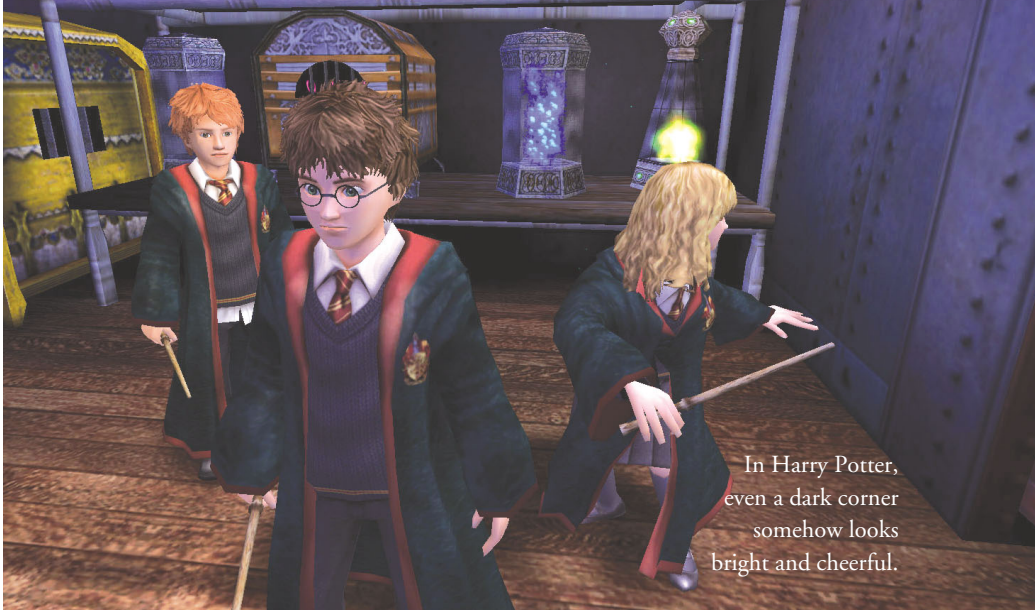
The outdoor missions generally involve running from point to point to trigger special events. The new indoor castle levels are randomly generated and packed with traps, but these new obstacles serve only to slow down the gameplay instead of adding new challenges. And because the castles contain several floors, these missions seem interminable. It's time Koei stopped trying to improve this series by adding gimmicky features and started improving the elements that are sorely in need of updating, such as the artificial intelligence and repetitious levels. There's a gem of a game in there just waiting to be unearthed, but for every shovelful of dirt Koei scrapes away, it seems to add one or two shovelfuls back. Samurai Warriors is a perfect example of that trend. ■

BY TRACY BAKER

Samurai Warriors

$49.99
Koei
www.koei.com
ESRB: Teen

Harry Potter And The Prisoner Of Azkaban (NGC, PS2, Xbox)



In Harry Potter, even a dark corner somehow looks bright and cheerful.

Harry Potter, now in his third year at Hogwarts, is expected to start making his claim to wizard-apprentice fame. His preadolescent challenges *should* transfer quite nicely from the "Prisoner of Azkaban" book and movie to the game, but we weren't terribly impressed with the Electronic Arts adaptation.

"Azkaban," the book, is a dark tale about misunderstood dragons and time-twisting alternative realities. It's a children's story, but adults read it for the story's moral ambiguity and unpredictable plot twists. EA's version is a little too cheery. It should have pushed for a darker treatment here, similar to its Lord of the Rings games. Harry looks like an earless Mickey Mouse from "The Sorcerer's Apprentice." The spells are not so much powerful as silly. Gameplay consists mainly of solving puzzles and finding your way through various labyrinths.

In Azkaban, Harry Potter searches for Peter Pettigrew, the rat-man of Hogwarts, and confronts escaped convict Sirius Black. EA nails the general plot points, and at times it does feel as though you're playing the movie.

The supposed big selling point to Azkaban is that you can now play as Ron or Hermione, but there's little difference between the characters in terms of how you complete puzzles. Overall, Azkaban fails to capture the essence of the franchise, which is less about silly challenges and minigames and more about heroic adventures and prevailing against evil. ■

BY JOHN BRANDON

Harry Potter And The Prisoner Of Azkaban

$39.99
Electronic Arts
www.harrypotter.ea.com/hppoa
ESRB rating: Everyone

Shadow Ops: Red Mercury (Xbox)

If Splinter Cell's Sam Fischer worked on a team and shaved more often, he might serve as an adequate replacement for Frank Hayden, the special forces agent in Shadow Ops: Red Mercury. An Xbox shooter set in the modern era of nuclear bomb threats, Shadow Ops engages you with massive explosions, intricately designed missions, and a healthy dose of firepower. It sounds like a thrilling ride, but it almost immediately goes sour due mostly to the game's poorly programmed AI.

The problems start during the second mission. Enemies seek cover adequately, but they almost all look and act the same. Just when you think you've mowed down the last terrorist hiding behind a cement blockade, another one pops up, just waiting to be killed. Worse, teammate AI is almost nonexistent. It's Serious Sam with a modern warfare theme, set in Paris, the Middle East, and Kazakhstan.

The game's saving grace is its support for 5.1 Dolby Pro Logic surround sound, which sounds amazing. Explosions in particular will rock the floorboards of your house, and the orchestral soundtrack is easily one of the best ever for Xbox. You'll hear piercing screams and rat-a-tat machine guns from every corner of the room. You never know what audio tricks the game has up its sleeves, which almost makes Shadow Ops worth playing.

The scripted action gets old after awhile, but the sound is awesome.

Xbox Live and co-op split screen modes play more like required add-ons and are hardly exceptional. Also, the weapons lack both visual and force-feedback punch. It's not a bad military shooter, but we'd recommend waiting for either Call Of Duty: Finest Hour or Brothers In Arms (shipping this fall) and let this one slip into the bargain rack. ■

BY JOHN BRANDON

Shadow Ops: Red Mercury

$49.99
Atari
www.atari.com/shadowops
ESRB rating: Teen

Driv3r (PS2, Xbox)

Driv3r comes across looking good in screen shots, but gameplay falls well short of the hype machine.

We were excited when Atari's Grand Theft Auto III killer, Driv3r, finally arrived in our mailbox. From the beginning, the game radiates excellent production values reminiscent of an A-list film. We were immediately intrigued as we watched the gritty cut-scene that sets up the storyline. But the game's sheen lost its luster the second we stepped into the shoes of Tanner (voiced by Michael Madsen). His movements felt clumsy, and weapon aiming just didn't feel right. This observation didn't change even several hours into the game. Fortunately, the imprecise control of your character is offset by spending most of your time driving around, hence the name of the game. Driving in the game is not so bad, and the physics usually feel pretty decent.

The game starts in Miami and moves to Nice and eventually to Istanbul (three cities a la GTA3—very original). The linear nature of the game ensures that you won't spend much time exploring said cities in a free-roaming mode. Besides, the gameplay and storyline begin to grate on you, and the fun is slowly sucked out of the game. You'd be doing yourself and GTA3 a disservice if you think Driv3r is a pretty version of GTA3. It's not. And while there are a few highlights, the gameplay and graphics end up being sloppy, ponderous, and unoriginal. Having Michael Madsen, Ving Rhames, Mickey Rourke, and Michelle Rodriguez in the credits does nothing to lift this game out of the gutter. We recommend saving your dosh for something better. ■

BY SAMIT GUPTA CHOUDHURI

Driv3r

$49.99
Atari
www.driv3r.com
ESRB: Mature

Spider-Man 2 (NGC, PS2, Xbox)

"Spider-Man 2" enjoyed blockbuster success this past summer and was praised by both critics and fans. (Director Sam Raimi is already working to bring "Spider-Man 3" to the big screen by summer 2007.) The last Spider-Man game based on the first movie was about average and didn't take gamers by storm. This time around, developer Treyarch did a much better job.

Spidey 2's storyline broadly follows the movie and Spidey's tangles with Doctor Octopus. But the game also includes appearances from other villains such as Mysterio, Lizard, and Rhino. These baddies bring more gameplay value to the table, but the game unfortunately doesn't spend very much time with the main story once Doc Ock is gone. That's a pity when you consider that Treyarch took a chapter from Grand Theft Auto III's open-gameplay style. Spider-Man can go anywhere that he can see. And swinging the webbed wonder through the city is in itself quite entertaining. You really get a feel for being Spider-Man, and it's quite an achievement to do this without noticeable load times. The city is huge but doesn't offer much after you've spent a few hours playing.

The game's graphics are usually quite good, although the average citizen populating the city looks pretty poor—and not in the financial way. The voices and audio in the game are dead-on, and you'll hear the real movie characters voicing their parts in the game. Overall, Spider-Man 2 is an enjoyable rental, but we'd be hard-pressed to actually buy it. ■

BY SAMIT GUPTA CHOUDHURI

Spider-Man 2

$49.99
Activision
www.activision.com/spider-man
ESRB: Teen

The sheer enjoyment of swinging and slinging will keep you in Spidey's tights for at least a little while. The game's an OK rental, but the movie is a must-see.

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Retroscope

The Rise & Fall Of Dial-Up

If your household has access to the Internet, chances are the access is provided by a device called a modem. And if you are like most Internet users at home, the modem you use is an old-fashioned dial-up type that connects to the Internet by making a phone call and emitting a bunch of strange-sounding tones.

While many Internet-connected households today have high-speed or broadband access through cable or DSL (Digital Subscriber Line) modems, the majority of at-home Internet connections still are made with slower dial-up or "narrowband" modems. According to Nielsen/NetRatings, a market research firm that tracks Internet traffic, as of last May in the United States, 51.4% of individuals went online at home via narrowband modems while 48.6% used some type of broadband modem.

Even though broadband users may consider narrowband terribly antiquated, the dial-up modem is, in fact, a technically sophisticated device that was developed over many decades.

The Early Days

The technological history of the narrowband modem can be traced to the 1930s when the Bell System (aka the phone company) was developing "telephotography machines," the precursors to the modern fax machine. It was in the 1950s, however, when work on the first modems began, at the behest of the U.S. military, which needed a way to transmit data over ordinary phone lines.

At the start of the 1960s, modems moved out of the domain of defense and into the realm of business. In 1962, American Telephone and Telegraph Company (AT&T) introduced what is widely regarded as the first commercially available modem, the Bell 103. It directed data moving in and out simultaneously, so-called full-duplex data transmission.

In June 1981, a small modem maker named Hayes Microcomputer Products introduced the AT Command Set, which was an array of instructions that a personal computer could transmit to the modem to start it working. The first Hayes modem to use the AT Command Set was the Smartmodem, a 300bps (bits per second) model that used FSK (frequency-shift keying) modulation, says Dennis C. Hayes, a co-founder of the company that carried his name.

"The idea was to make the technology more complicated on the inside so it could be simpler on the outside," says Hayes.

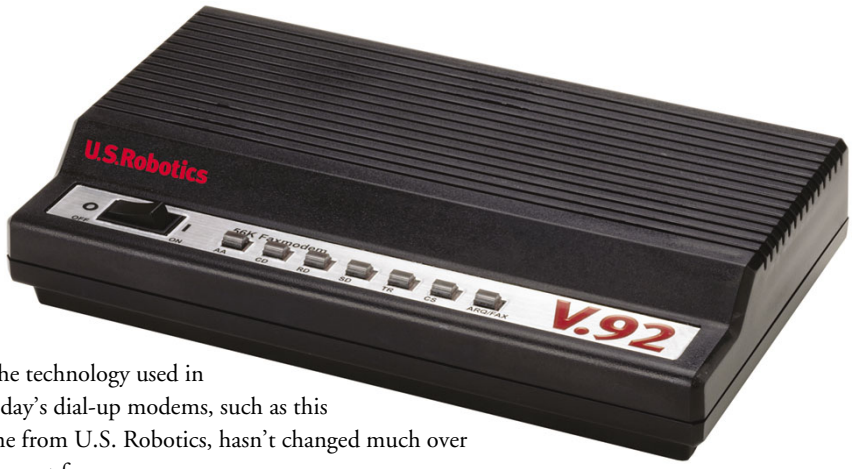
There were two other important aspects of the Smartmodem, Hayes recalls. First, it could connect to any computer that contained a serial port, and many computers were available with such a port. Second, the Smartmodem contained a microprocessor to interpret the commands from the computer and control the modem's functions, Hayes says.

A New Beginning

In the fall of 1981, Hayes recalls, IBM introduced the first PC, which he says legitimized the computer as a business tool and opened the market for the modem.

Before long, other modem manufacturers adopted the AT Command Set to control their modems, and the instruction set became the de facto standard in the modem industry, along with serial port connections and onboard microprocessors.

"Then, the race was on for speed increases," Hayes says.



The technology used in today's dial-up modems, such as this one from U.S. Robotics, hasn't changed much over the past few years.

The Smartmodem 2400, a 2,400bps modem that used PSK (phase-shift keying) modulation, debuted next alongside similar modems from competing manufacturers.

There was no 4,800bps modem, however. The next development was the 9,600bps modem. It was made possible in 1984 by a new modem technology standard named V.32, which was set by the International Telegraph and Telephone Consultative Committee (CCITT) of the International Telecommunication Union (ITU).

In 1991, a modified V.32 standard, named V.32*bis*, was issued by CCITT, and modems were introduced that could operate at a speed of 14,400bps. In 1994, the CCITT introduced yet another new modem technology standard, named V.34, and the speed of new modems doubled again to 28,800bps.

Meanwhile, Hayes recalls, other technologies that were useful in modems also were developing: error control and compression. The CCITT set a standard named V.42 in 1988 that specified how a modem that received damaged data packets could return a request to the sending modem asking for those packets to be retransmitted.

Error control allowed compression of the data, Hayes notes, adding that without error control, compression would be impossible. A single-bit error would prevent the rest of the data from being decompressed, he says, because all the data following the error would be seen by the modem as junk.

In 1990, the CCITT set a standard named V.42*bis* that incorporated both error control and a 4:1 "lossless" data compression technology. This made it possible for a 14,400bps modem to offer a theoretical top speed of 57,600bps. But in reality, Hayes says, port speed was mostly doubled in modems that adhered to the V.42*bis* standard.

In the late 1990s, rival technology companies developed competing formulas for boosting modem speeds to a maximum of 56,600bps. The competing formulas for these so-called 56K modems were known as x2 (supported by U.S. Robotics) and 56Kflex (supported by Lucent Technologies, Rockwell, and Motorola).

In 1998, a new industry standard for 56K modems called V.90 was set that settled the arguments between the two camps. Then, the evolution of the narrowband modem slowed dramatically, while broadband modems have proliferated.

Several years later, another standard called V.92 was set. It added several important features to the 56K modem, including shortening the time it took to forge a dial-up connection.

"Year after year it was a race to improve the speed, improve the functionality, and it was all driven underneath by what the microprocessor industry could deliver," Hayes recounts.

Now, he says, "The cost of bandwidth continues to come down the way the cost of semiconductors came down over the past 20 years," and the race for faster and faster modems is still on, driven by the advent of video and other "rich media" online.

So, a "1Mbps [modem speed] is OK for today's systems," Hayes adds. But in the not-too-distant future, he predicts, "multimegabit connections will become reasonable." Narrowband modems continue to predominate for now, but it is broadband that will be the standard bearer in the future. CE

BY ROBERT E. CALEM

Timeline

1962: AT&T introduces the Bell 103, the first commercial modem.

1976: Popular modem manufacturer U.S. Robotics is founded.

1977: Dennis Hayes, who develops the first modem for modern PC users, founds D. C. Hayes Associates.

1984: V.32 modems become available and transfer data at 9,600bps.

1989: DSL developed, initially as a means to transfer video data over a network.

1991: The V.32*bis* standard is approved. It is followed by the V.34 and V.34*bis* standards, in 1994 and 1996, respectively.

1997: Two competing 56Kbps (kilobits per second) modem standards emerge, called 56Kflex (from Motorola, Lucent, and Rockwell) and x2 (U.S. Robotics).

1998: The ITU approves the V.90 standard, replacing the two previous competing standards.

2000: The V.92 standard is approved and still in use in current dial-up modems.

2004: Although dial-up use in homes is declining, dial-up users are still more prevalent than broadband users, 51.4% to 48.6%.

CE Pick Of The Month

Future Perfect

This month's CE Pick Of The Month is a bit of a departure from our usual format, in which we pick our favorite current product from each issue. That's not because there aren't any good currently available products this month—because there certainly are—but when all is said and done, one product that really jumps out at us as the most innovative and fun is one that isn't yet on store shelves.

In other words, this POTM is more of a prediction than a hands-on choice of a product we've evaluated, and predictions can be dangerous. But the item in question comes from a company that has been the dominant force in its market now for nearly a decade and has been a leading name in consumer electronics for much longer than that. As such, we're confident that this item will make a splash when it finally arrives, which at the moment looks to be March 2005.

What is this device that has us in such a lather, you ask? It's Sony's PSP, or PlayStation Portable. You'll find our report on the next generation of handheld gaming systems on page 82, and as we point out in that article, there are clearly still questions about the PSP that need to be answered. But it's a good idea to keep in mind that industry pundits and consumers alike scratched their heads when Sony first shipped the original PlayStation all those years ago in 1995, and that seems to have worked out pretty well, to say the least.

There's no denying that Nintendo has done incredibly well with its Game Boy family of systems, and the upcoming Nintendo DS looks intriguing, as well, but we think the PSP will be better than other handheld systems in a couple of fairly significant ways. First, its beautiful, 4.3-inch 16:9 screen is bright and sharp (480 x 272)—a vast improvement over any portable system we've seen to date. Second, its control set looks to be much friendlier to larger hands and includes analog control, something we've grown quite attached to over the past few years.

Add to these advantages its processing power (it will be only slightly less powerful than the PS2), its USB and wireless connectivity options, its 1.8GB optical media, and its ability to play music and movies, and you have a portable game system with the potential to change the way people think about handheld gaming.

We'll bring you more information on this enticing gadget as we get closer to its arrival, but in the meantime Sony's PSP is our CE Pick Of The Month.

Sony's PSP, shown here in actual size.

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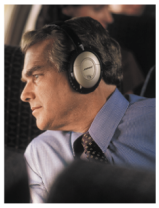

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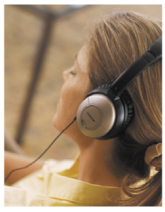

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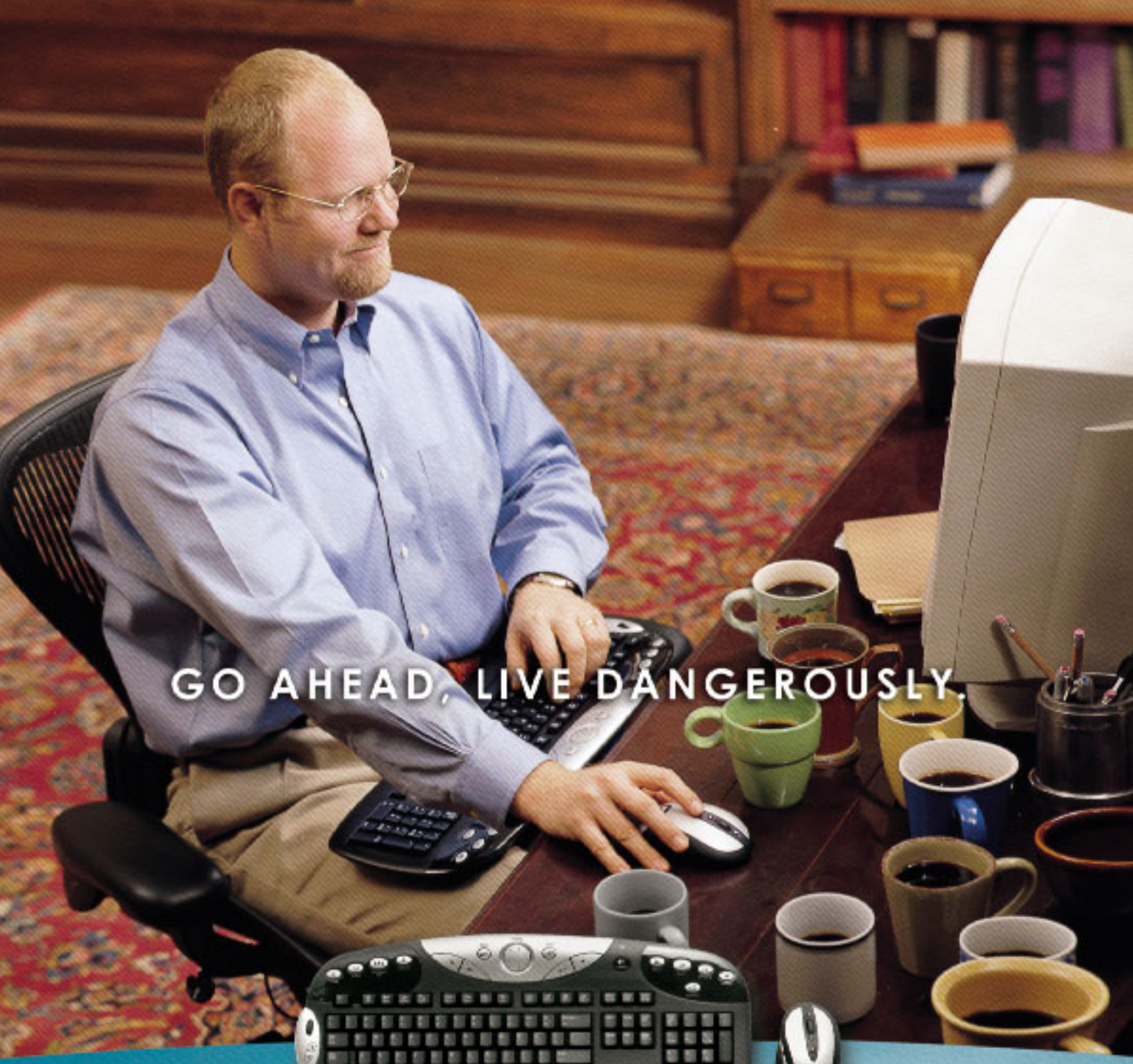

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